Division of Oil, Gas, and Geothermal Resources

Preliminary Assessment of Eleven Aquifers Historically Treated as Exempt

July 15, 2015

Executive Summary

The Division of Oil, Gas and Geothermal Resources has made a preliminary evaluation of whether current data support a determination that the eleven aquifers historically treated as exempt currently meet the criteria for an aquifer exemption.

The eleven aquifers historically treated as exempt, and significant relevant data for each, are as follows:

- The **South Tapo Canyon** field - the **Pico** formation (no longer being used);

  Injection Wells: 0 TDS: 1,900 ppm NaCl Depth: 0- 1,000'

- The **Blackwell's Corner** field - The **Tumey** formation (no longer being used);

  Injection Wells: 0 TDS: 2,100 -2,600 mg/l Depth: 945' – 1,473'

- The **Kern Bluff** field – the **Kern River** formation (no longer being used);

  Injection Wells: 0 TDS: 400 – 900 mg/l Depth: 0- 200'

- The **Kern Front** field – the **Santa Margarita** formation;

  Injection Wells: 13 TDS: 460 – 2,318 mg/l Depth: 2,197' – 2,840'

- The **Kern River** field -the **Chanac** formation;

  Injection Wells: 12 TDS: 926 – 3,325 mg/l Depth: 425' – 1,335'

- The **Kern River** field – the **Santa Margarita** formation;

  Injection Wells: 32 TDS: 490 – 1,584 mg/l Depth: 760' – 2,285'

- The **Mount Poso** field – the **Walker** formation;

  Injection Wells: 5 TDS: 1,069 mg/l Depth: 1,740' – 1,796'

- The **Round Mountain** field – the **Olcese** formation;

  Injection Wells: 6 TDS: 2,693 mg/l Depth: 710' – 850'

- The **Round Mountain** field - the **Walker** formation;

  Injection Wells: 30 TDS: 2,335 mg/l Depth: 1,890' – 2,590'

- The **Bunker Gas** field - **all aquifers** within the field that are not in a hydrocarbon producing zone (no longer being used);

  Injection Wells: 0 TDS: 1,215 mg/l Depth: 3,000'

- The **Wild Goose** field - **All aquifers** within the field that are not in a hydrocarbon producing zone (no longer being used);

  Injection Wells: 0 TDS: 2,800 -5,000* mg/l Depth: 2,700' - 3,400'

  *More recent analysis indicate TDS around 24,000 mg/l

Key portions of the above data, in spreadsheet form:

Historically Treated as Exempt Aquifers Snapshot						
Field	Formation	Number of Active Injection Wells	Total Dissolved Solids of Formation	Total Disolved Solids of Injected Fluid	Depth	Historic Volumes Injected Since 1983 in Barrels
South Tapo Canyon	Pico	0	1,900 ppm NaCl	600 ppm NaCl	1,000'	0
Blackwell's Corner	Tumey	0	2,100 - 2,600 mg/l	29,000 ppm NaCl	945' - 1,475'	2,425
Kern Bluff	Kern River	0	400 - 900 mg/l	600 mg/l	200	5,816,190
Kern Front	Santa Margarita	13	460 - 2,318 mg/l	360 - 6,400 mg/l	2,197' - 2,840'	151,820,215
Kern River	Chanac	12	926 -3,325 mg/l	491 - 2,000 mg/l	425' - 1,335'	568,987,463
Kern River	Santa Margarita	32	490 - 1,584 mg/l	491 -74,924 mg/l	760' - 2,285'	799,041,272
Mount Poso	Walker	5	1,069 mg/l	650 mg/l	1,740' - 1,796'	63,777,556
Round Moutain	Olcese	6	2,693 mg/l	1,900 mg/l	710' - 850'	160,798,008
Round Mountain	Walker	30	2,335 mg/l	1,600 - 2,900 mg/l	1,890' - 2,590'	1,529,910,014
Bunker	Undifferentiated	0	1,215 mg/l	10,675 - 11,025 ppm Chloride	3,000'	51,454
Wild Goose	Undifferentiated	0	24,349 mg/l	24,349 mg/l	2,700' - 3,400'	0

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Preliminary Assessment of Eleven Aquifers Historically Treated as Exempt

July 15, 2015

The US EPA, State Water Board, and the Division have agreed that the State will submit an evaluation of each of the 11 Historically Treated as Exempt (HTAE) aquifers with a preliminary assessment as to whether current data would support a determination that the criteria for an aquifer exemption are met.

11 HTAE aquifers historically treated as exempt are as follows:

- The **Pico** formation within the boundaries of the **South Tapo Canyon** field (no longer being used);
- The **Tumey** formation within the boundaries of the **Blackwell's Corner** field (no longer being used);
- The **Kern River** formation within the boundaries of the **Kern Bluff** field;
- The **Santa Margarita** formation within the boundaries of the **Kern Front** field;
- The **Chanac** formation within the boundaries of the **Kern River** field;
- The **Santa Margarita** formation within the boundaries of the **Kern River** field;
- The **Walker** formation within the boundaries of the **Mount Poso** field;
- The **Olcese** formation within the boundaries of the **Round Mountain** field;
- The **Walker** formation within the boundaries of the **Round Mountain** field;
- **All aquifers** within the **Bunker Gas** field that are not in a hydrocarbon producing zone and that have groundwater that has less than 10,000 TDS (no longer being used); and
- **All aquifers** within the **Wild Goose** field that are not in a hydrocarbon producing zone and that have groundwater that has less than 10,000 TDS (no longer being used).

More detail on each aquifer is set out below.

South Tapo Canyon Field, Pico Zone, Ventura District

1) Number of disposal wells permitted in the zone:
   0

2) Number of active producers:
   0

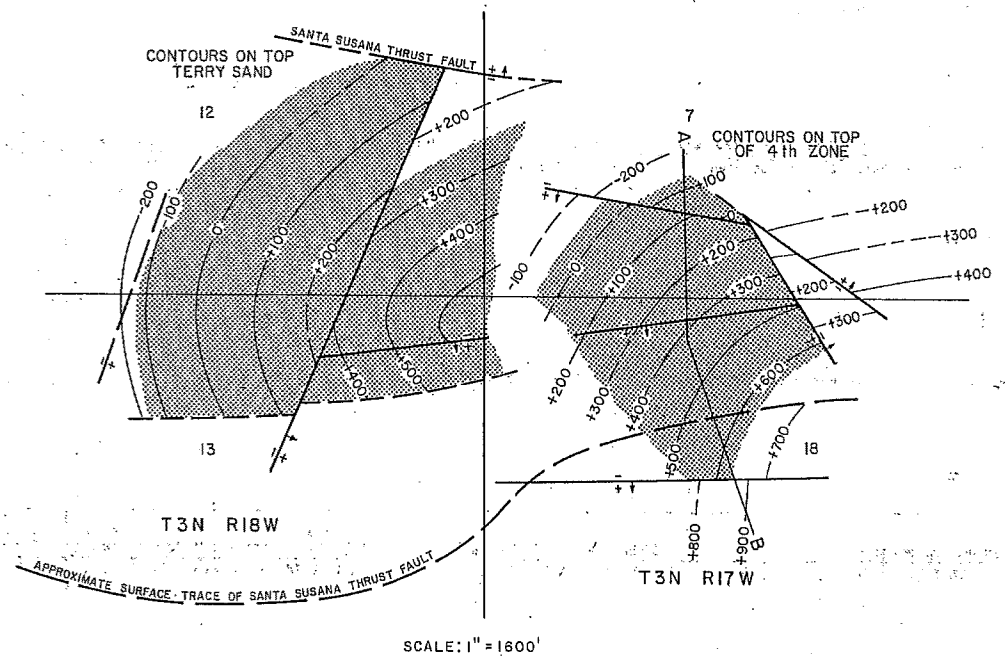
3) Depth of the zone across the field:
   At the surface on the south side of the field to 1,000 ' below surface depth on the north side. There are opposing thrust faults therefore, there is a wide range in zone depth across the field. Zone dips to the north across the field. This is based on the data sheet.

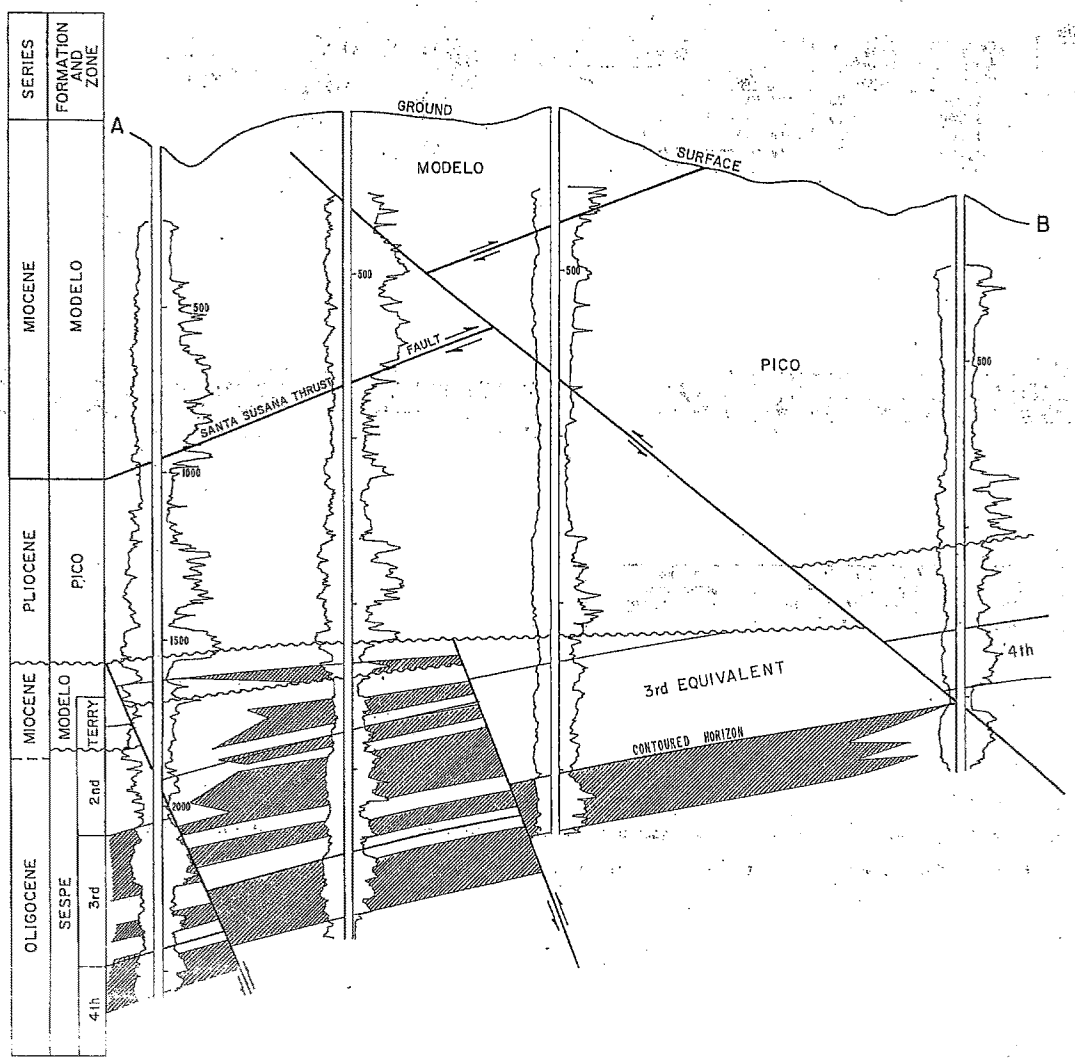
4) Volumes Injected Historically since 1983:
   None. District confirmed that there is no documentation that injection ever historically occurred in the Pico zone. The 5/17/1985 EPA letter contradicts this and indicates that injection did occur starting in 1948 and 1,903,000 Bbls was historically injected in this zone.

5) TDS of zone:
   1,900 ppm NaCl according to 5/17/1985 EPA letter

6) TDS of injection water:
   600 ppm NaCl according to the 5/17/1985 EPA letter

SOUTH TAPO CANYON OIL FIELD





LOCATION: 32 miles northeasterly of Ventura

TYPE OF TRAP: Faulted anticline

ELEVATION: 2,440

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production Oil (bbl)	Initial daily production Gas (Mcf)	Date of completion
Terry	Crown Central Petroleum Corp. "Tapo" 2	Terry and Jensen "Tapo" 2	13 3N 18W	SB	720	100	Feb 1953
2nd Sespe	Union Oil Co. of Calif. "South Tapo-Gillibrand" 11-7	Union Oil Co. of Calif. "Simi" 11-7	7 3N 18W	SB	99	411	Jul 1954
3rd Sespe	Same as above	Same as above	7 3N 18W	SB	*	*	Jul 1954
4th Sespe	Same as above	Same as above	7 3N 18W	SB	*	*	Jul 1954

Remarks: * Initial production from the 2nd, 3rd and 4th Sespe zones was commingled.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Havenstrite Oil Co. "Tapo" 1	Same	Jan 1949	13 3N 18W	SB	8,394	Llajas	Eocene

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Terry	2,200	60	Miocene	Modelo	32	*90	II
2nd Sespe	1,800	70	Oligocene	Sespe	18	1,030	II
3rd Sespe	1,880	220	Oligocene	Sespe	18	1,030	II
4th Sespe	2,200	180	Oligocene	Sespe	18	1,030	II

PRODUCTION DATA (Jan. 1, 1974)

1973 Production: Oil (bbl)	1973 Production: Net gas (Mcf)	1973 Production: Water (bbl)	1973 Proved acreage	1973 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
40,260	509	140,374	210	14	4,332,509	1,905,031	905,009	1953	50	35	240

STIMULATION DATA (Jan. 1, 1974)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: None

CURRENT CASING PROGRAM: 11 3/4" cem. 100; 7" combination string landed through zone and cemented through ports above zone.

METHOD OF WASTE DISPOSAL: All waste water is injected into a water-disposal well.

REMARKS: * Terry zone water is high in bicarbonates and total dissolved solids. A cyclic-steam project was started in 1964 and was discontinued in 1965 after the injection of 11,063 bbls. of water (in the form of steam).

REFERENCES: Hardoin, J.L., South Tapo Canyon Oil Field, Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 44, No. 1 (1958).

Blackwell's Corner Field, Tumey Zone, Bakersfield District office

1) Number of disposal wells permitted in the zone:
   0

2) Number of active producers:
   0

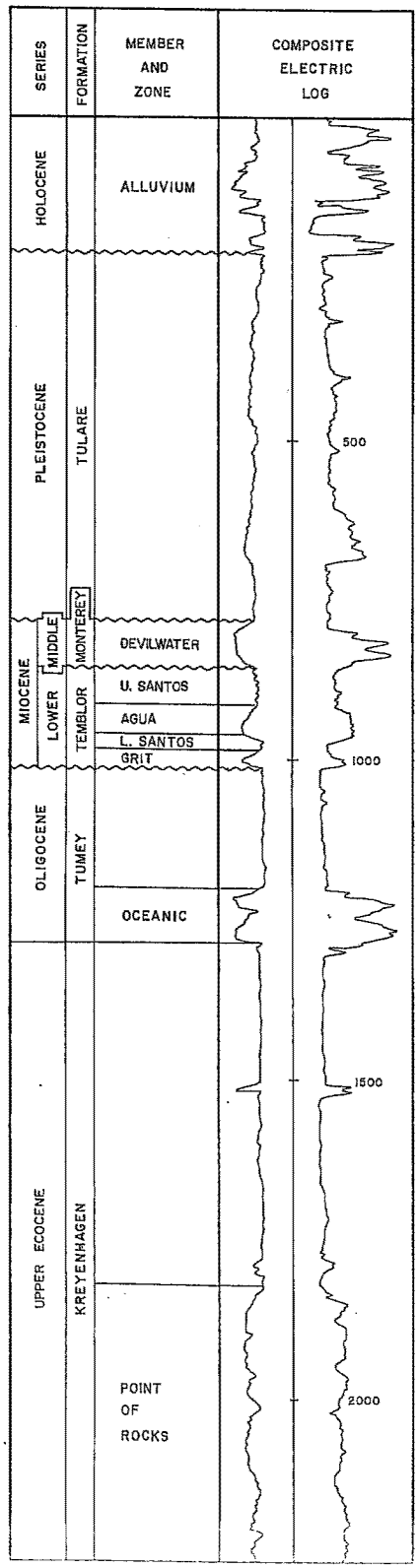
3) Depth of the zone across the field:
   945' to 1,473' below surface depth. Zone dips significantly to the Southeast across the field. Zone truncated by angular unconformity about ½ mile northwest of field.

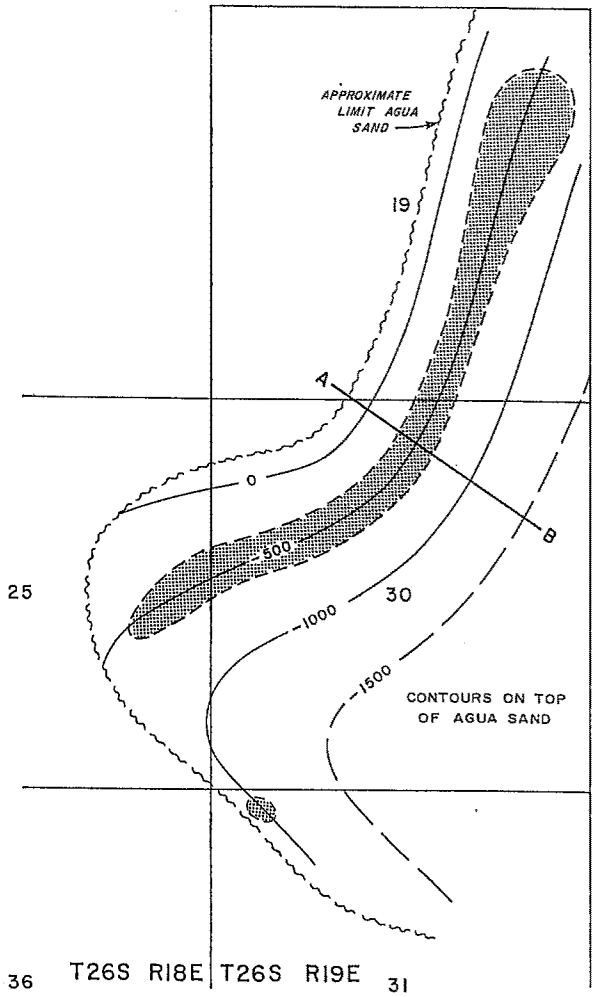
4) Volumes injected historically since 1983:
   2,425 Bbls, last injected on 5/1/1986

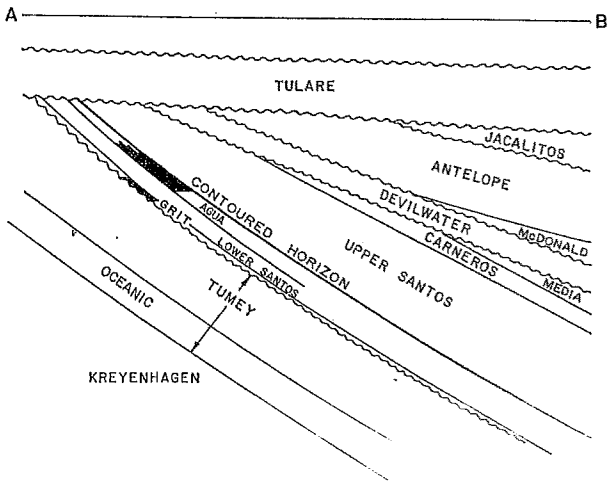
5) TDS of zone:
   Prior to injection 2,100 – 2,600 mg/l TDS (calculated) according to the 5/17/1985 EPA letter

6) TDS of injection water:
   29,000 ppm NaCl according to the 5/17/1985 EPA letter

BLACKWELLS CORNER OIL FIELD







LOCATION: 45 miles northwest of Taft

TYPE OF TRAP: Permeability barrier on an anticlinal nose

ELEVATION: 700

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Devilwater	General Crude Oil Co. Oper. "Occidental" 10	Etienne Lang "Occidental" 10-N.W. 30	30 26S 19E	MD	20	N.A.	Jun 1944
Agua	General Crude Oil Co. Oper. "Occidental" 3	Etienne Lang "Occidental" 3-N.W. 30	30 26S 19E	MD	50	N.A.	Dec 1943
Grit	General Crude Oil Co. Oper. "Occidental" 5	Etienne Lang "Occidental" 5-N.W. 30	30 26S 19E	MD	30	N.A.	Aug 1944

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
The Superior Oil Co. "O.L.C." 7	Same	Jul 1954	30 26S 19E	MD	3,224	Tumey	Oligocene

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Devilwater	700	25	middle Miocene	Temblor	13	N.A.	None
Agua	1,300	85	early Miocene	Temblor	14	790	None
Grit	1,400	5	early Miocene	Temblor	14	790	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
15,659	0	111,178	240	18	813,907	90,521	81,106	1946	63	38	250

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: None

CURRENT CASING PROGRAM: 7" cem. above zone; 5 1/2" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps.

REMARKS: Formerly known as Shale Hills Area.

REFERENCES: Karmelich, F.J., Blackwells Corner Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 37, No. 2 (1951).

Kern Bluff Field, Kern River Zone, Bakersfield District, East Side

1) Number of disposal wells permitted in the zone:
   0

2) Number of active producers:
   0

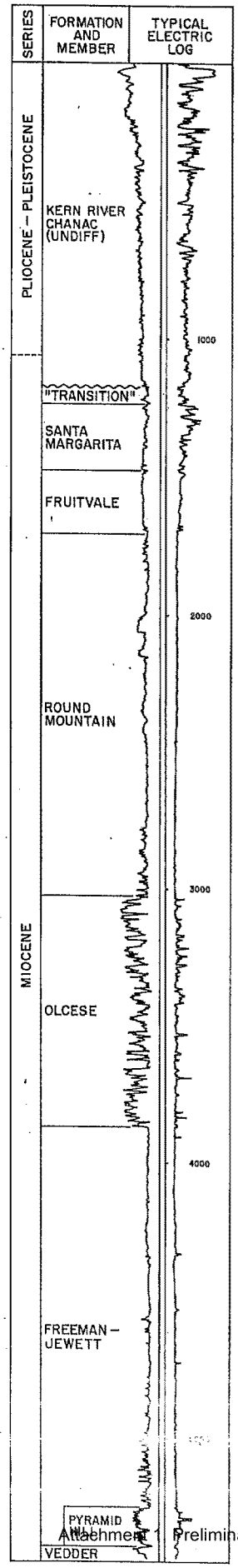
3) Depth of the zone across the field:
   Surface depth. Former WD well (API #02908849) uppermost perf is at 200' depth.

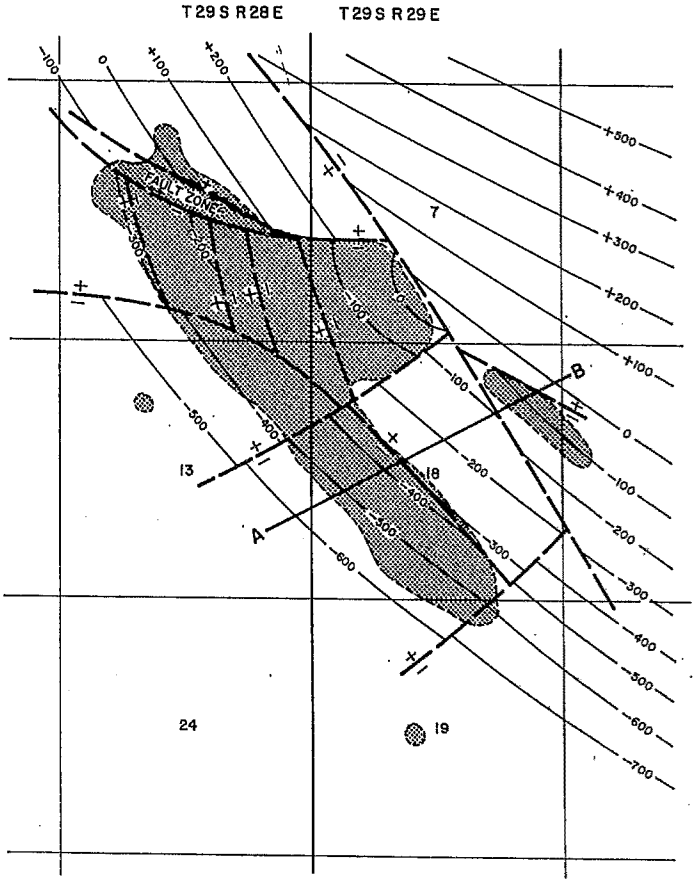
4) Volumes injected historically since 1983:
   5,816,190 Bbls, last injected on 6/1/1993

5) TDS of zone:
   400 – 900 mg/l according to the 5/17/1985 EPA letter

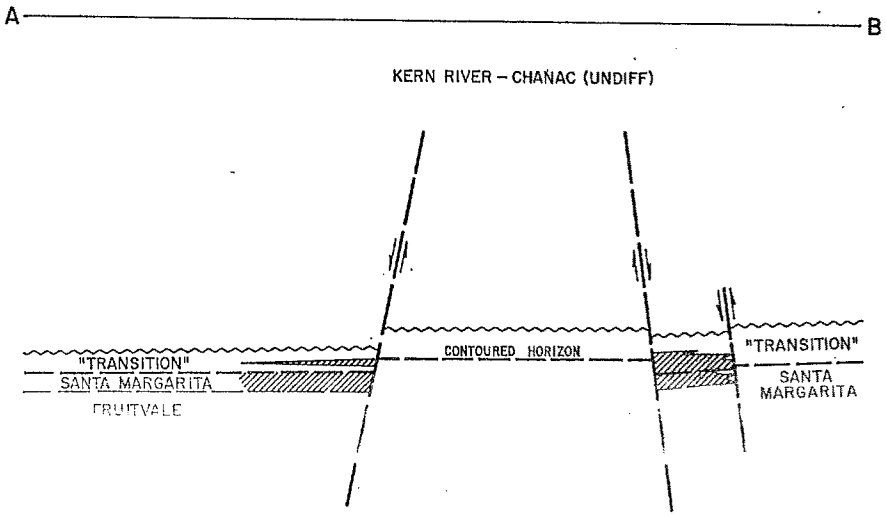
6) TDS of injection water:
   600 mg/l according to 5/17/1985 EPA letter

KERN BLUFF OIL FIELD





CONTOURS ON TOP OF SANTA MARGARITA



LOCATION: 6 miles northeast of Bakersfield

TYPE OF TRAP: Faulted homocline

ELEVATION: 800

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Transition	Shell Oil Co. "Afana" 1	Same as present	18 29S 29E	MD	18	N.A.	Feb 1944
Santa Margarita	Gulf Oil Corp. "Needham-Bloemer" 15	Oceanic Oil Co. "Needham-Bloemer" 1	7 29S 29E	MD	90	N.A.	Sep 1947

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Kernview Oil Co. "Muir" 13	Gene Reid Exploration Co. "Muir" 13	Feb 1949	18 29S 29E	MD	5,425	Vedder	early Mio

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Transition	740 - 1,350	30 - 80	late Miocene	Transition	14	5	None
Santa Margarita	950	55	late Miocene	Santa Margarita	14	5	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
216,477	0	3,365,718	670	131	9,410,522	0	845,373	1949	214	166	690

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
Cyclic-steam	1965	3,701,855	124

SPACING ACT: Applies

BASE OF FRESH WATER: 950

CURRENT CASING PROGRAM: 8 5/8" cem. above zone and across base of fresh-water sands; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Waste water is injected in disposal wells (808,148 bbls. in 1972), steam injection wells, and in unlined sumps where water quality meets Div. of Oil and Gas standards.

REMARKS:

REFERENCES: Corwin, C.B., Kern Bluff Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 36, No. 1 (1950).

Kern Front Field, Santa Margarita Zone, East Side Bakersfield District

1) Number of disposal wells permitted in the zone:
   13

2) Number of active producers:
   0

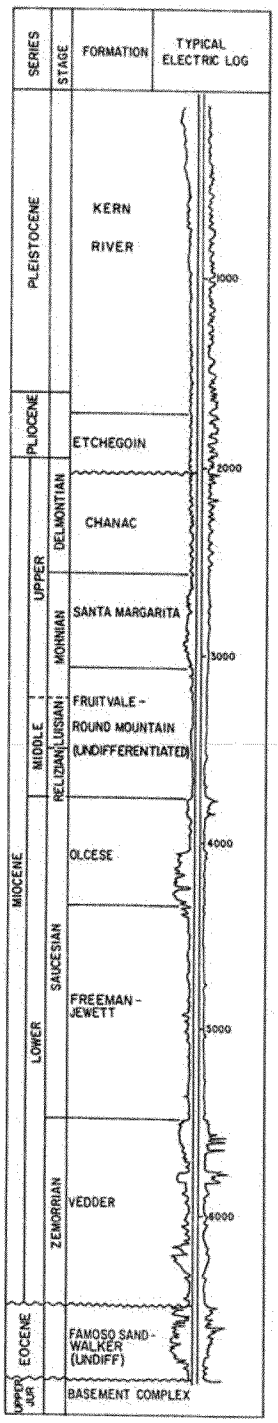
3) Depth of the zone where the injection wells are located:
   2,197' to 2,840' below surface

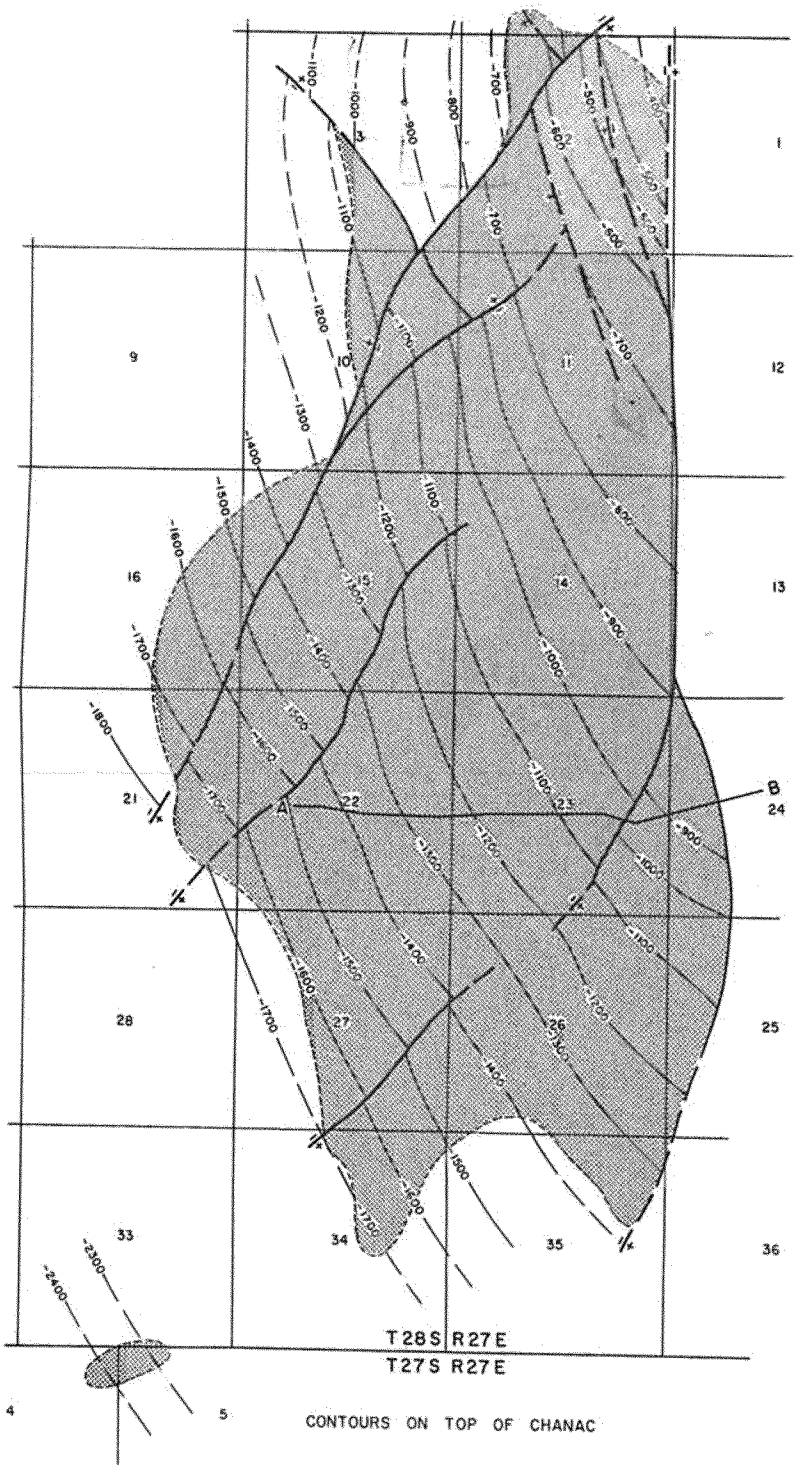
4) Volumes injected historically since 1983:
   151,820,215 Bbls injected, last injected on 3/1/2015

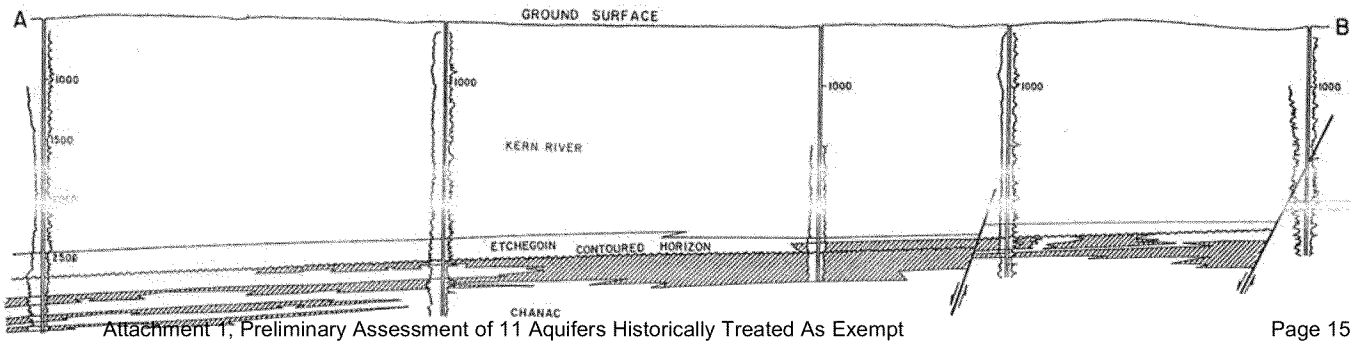
5) TDS of zone:
   460 mg/l - 2,318 mg/l TDS
   The 460 mg/l TDS sample is from the lower Santa Margarita zone in 4-4W well (029-62979) collected at a depth between 3,425'-3,255' on 12/9/1988 and the 2,318 mg/l TDS sample is from WD#1 (029-54754) well at a depth of 2,300' on 9/17/1975.

6) TDS of injection water:
   360 mg/l – 880 mg/l and 6,400 mg/l TDS.
   The 360mg/l TDS sample is from "injection wells "Movius" 3, 2 and D11 on 8/27/2010, the 880 mg/l TDS sample is from well Sec. 27 waste water to "Valley Waste KFF " on 11/2/1997 and the 6,400 mg/l TDS sample is the only high concentration sample collected from "waste water at injection well" on 4/11/2011. The 6,400 mg/l TDS sample is from project #33800012 and is most likely from the cogeneration and scrubber brine waste water. The permitted injection fluids in the Kern Front field, Santa Margarita zone consists of produced water from the Chanac, Etchegoin and Santa Margarita zones and cogeneration and scrubber brines from a plant.

KERN FRONT OIL FIELD







LOCATION: 5 miles northwest of Bakersfield

TYPE OF TRAP: Permeability variations on a faulted homocline

ELEVATION: 750

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production Oil (bbl)	Initial daily production Gas (Mcf)	Date of completion
Btchegoin	Standard Oil Co. of Calif. No. 1	Same as present	15 28S 27E	MD	10	N.A.	1912
Chanac	Standard Oil Co. of Calif. No. 1	Same as present	27 28S 27E	MD	190	N.A.	Aug 1914

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Atlantic Richfield Co. "Kramer" 1	Richfield Oil Corp. "Kramer" 1	Sep 1941	34 28S 27E	MD	7,738	Basement (slate)	Late Jur

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Btchegoin	2,265	70	Pliocene	Btchegoin	14	N.A.	None
Chanac	2,320	250	late Miocene	Chanac	15	5	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
3,148,559	293,008	25,578,898	5,000	852	128,591,808	14,667,840	4,535,059	1929	1,322	1,206	5,055

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
Cyclic-steam	1964	14,142,183	478

SPACING ACT: Does not apply

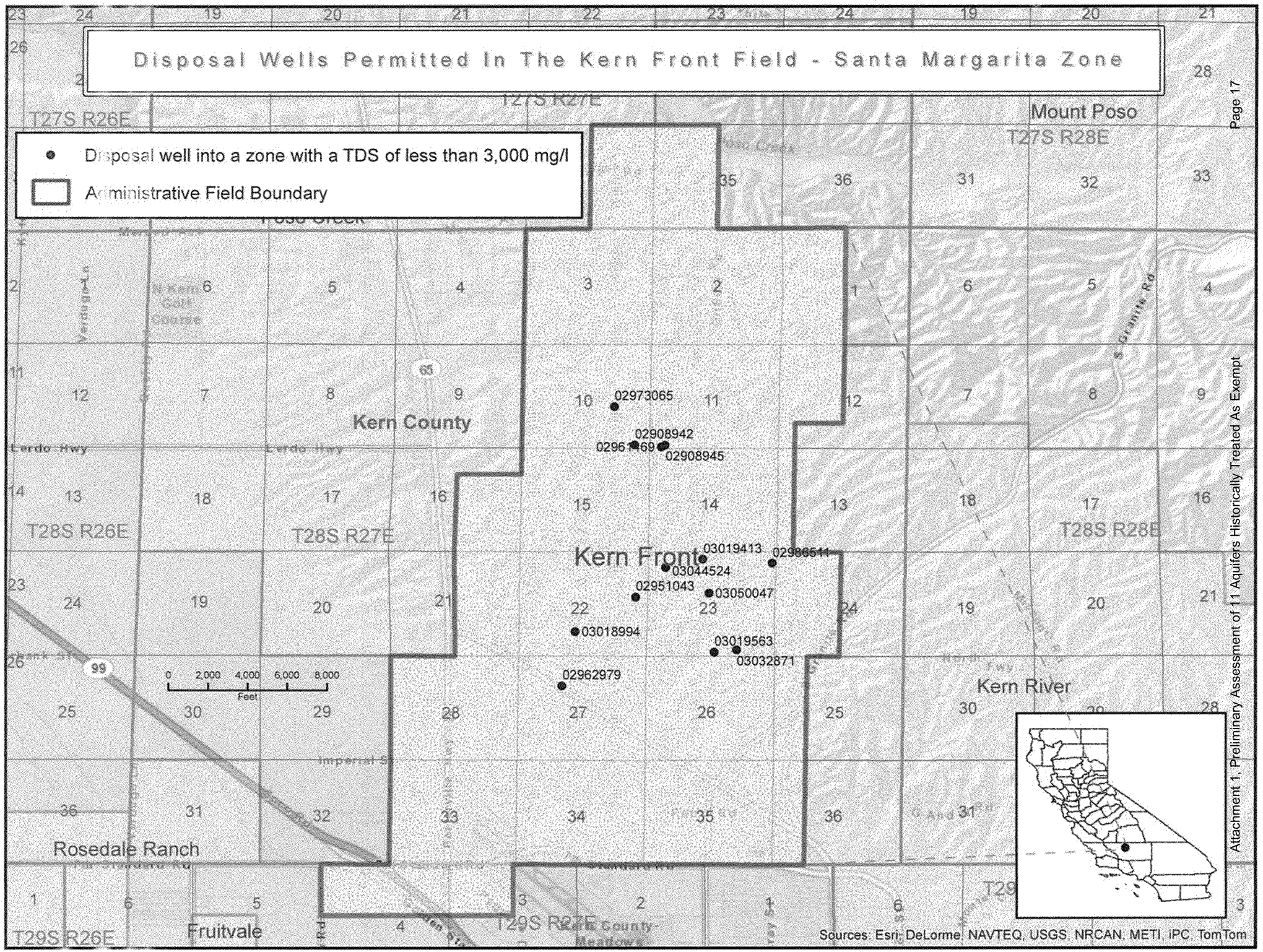
BASE OF FRESH WATER: 1,300

CURRENT CASING PROGRAM: 8 5/8" cem. above zone and across base of fresh-water sands; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Unlined sumps.

REMARKS: A steam displacement project was started in the Kern River - Chanac zone in 1966 and terminated after 99,587 bbls. was injected.

REFERENCES: Brooks, T.J., Kern Front Oil Field, A.A.P.G., S.E.P.M., S.E.G., Guidebook Joint Annual Meeting, Los Angeles, Calif., 1952, p. 159-161.
Park, W.H., Kern Front Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 51, No. 1 (1965).



Kern River Field, Chanac Zone, East Side Bakersfield District

1) Number of disposal wells permitted in the zone:
   12 (10 of these are permitted in both the Santa Margarita and Chanac Zones in the Kern River field)

2) Number of active producers:
   0

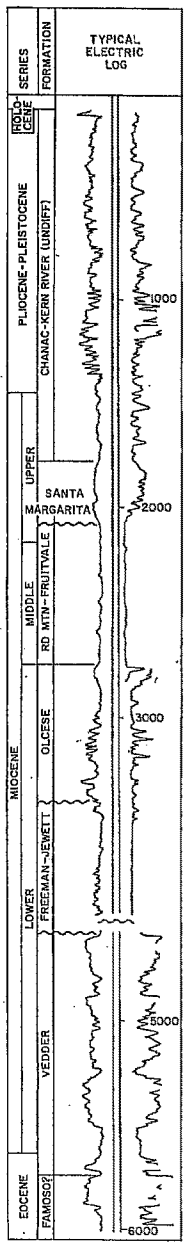
3) Depth of the zone where the injection wells are located:
   425' to 1,335' below surface. Zone dips to the Southwest across the field.

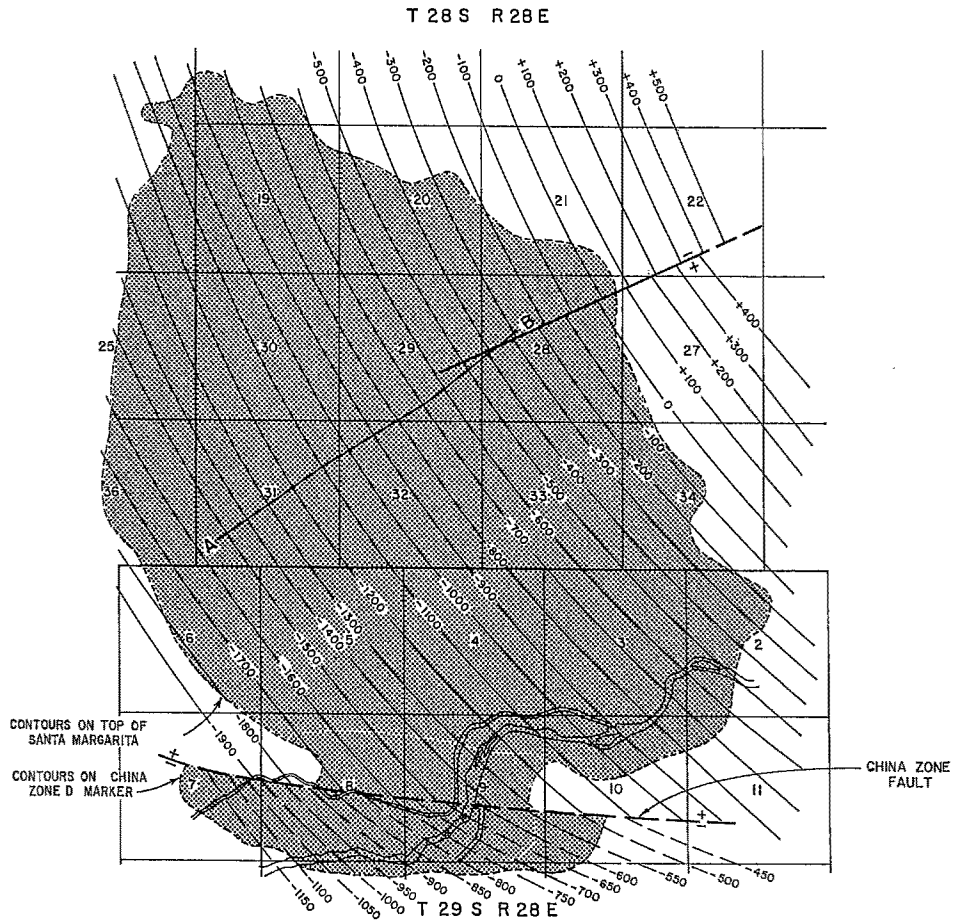
4) Volumes injected historically since 1983:
   568,987,463 Bbls, last injected on 3/1/2015

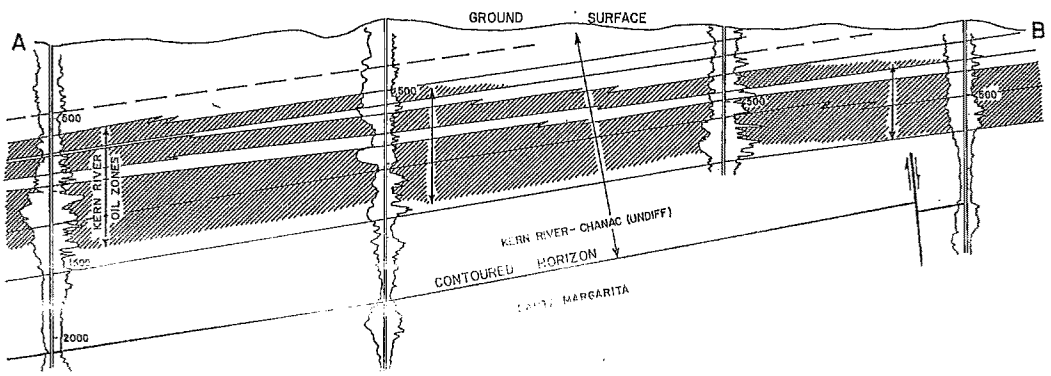
5) TDS of zone:
   926 mg/l – 3,325 mg/l TDS
   The 926 mg/l TDS sample is from well 21-4 top zone perf 1,220-1,223 " (upper Chanac) on 05/22/1978 and sample 3,325 mg/l TDS sample is from "Chanac Zone KCL-10 2x" on 2/11/1987.

6) TDS of injection water:
   491 mg/l – 2,000 mg/l TDS
   The 491 mg/l TDS sample is from "Jost Plant Sec. 10, T29S/28E Waste disposal plant tank" on 11/23/1999 and sample 2,000 mg/l TDS sample is from "Cogen Disposal Water" on 11/26/1997. Permitted fluid in the Chanac zone, Kern River field consists of produced Kern River produced water from Kern River field and co-gen waste.

KERN RIVER OIL FIELD







LOCATION: 5 miles north of Bakersfield

TYPE OF TRAP: Permeability variations on a homocline

ELEVATION: 400 - 1,000

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Kern River	Elwood Brothers (no name well)	Same as present	3 29S 28E	MD	N.A.	N.A.	1899
China Zone	Westates Petroleum Co. "KCL" 1	Horace Steele and L.C. Gould "KCL" 1	8 29S 28E	MD	50	0	Sep 1947

Remarks: The discovery well was dug by hand in the spring of 1899 on what is now Chanslor-Western Oil Development Co. property. "Gassy vapors" caused the well to be abandoned without a test of its commercial possibilities. In June 1899 McWhorter Bros. drilled the first commercial well 400 feet north of the discovery well.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Standard Oil Co. of Calif. "KCL 26" 1-11	Same	Oct 1948	9 29S 28E	MD	6,986	Granite	Jurassic

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Kern River	900	700	late Pliocene	Kern River	13	5	None
China Zone	1,300	100 - 500	late Pliocene	Kern River	13	40	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
27,154,427	4,165	188,121,732	9,535	4,526	576,511,857	2,599,678	27,154,427	1972	7,942	6,978	9,850

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
Cyclic-steam	1961	300,849,501	5,215
Steam flood	1962	189,380,134	780

SPACING ACT: Does not apply

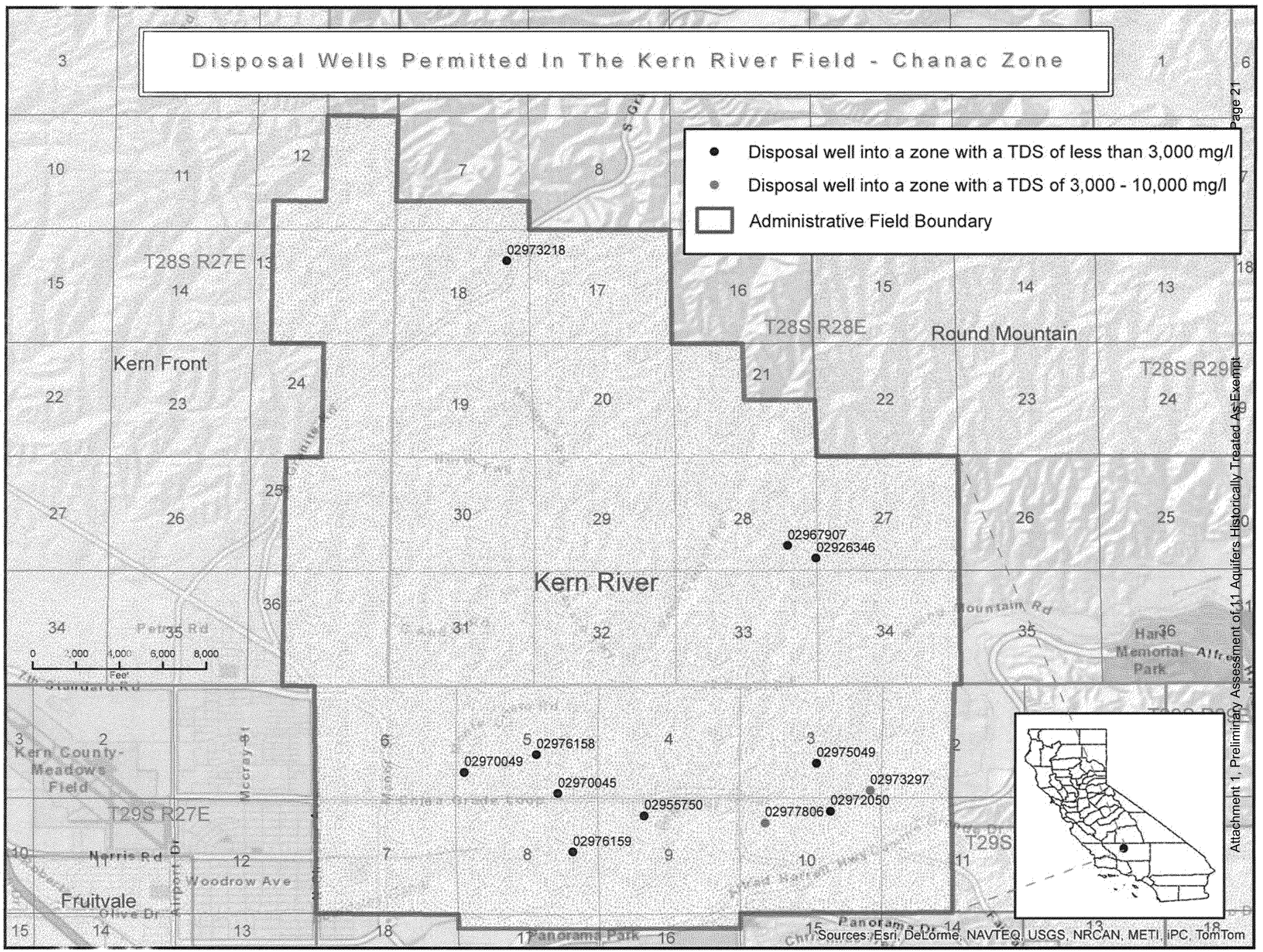
BASE OF FRESH WATER: 2,500

CURRENT CASING PROGRAM: 6 5/8" cem. through zone.

METHOD OF WASTE DISPOSAL: Waste water is injected into the Santa Margarita and Vedder, 12,143,578 bbls. in 1972. Waste water is also used in steam generation. The balance of the water is of a suitable enough quality that it is allowed to enter percolation ponds, irrigation canals, & the Kern River

REMARKS:

REFERENCES. Crowder, R.E., Kern River Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 38, No. 2 (1952).



Kern River Field, Santa Margarita Zone, East Side Bakersfield District

1) Number of disposal wells permitted in the zone:
32 (10 of these are permitted in both the Santa Margarita and Chanac Zones in the Kern River field)

2) Number of active producers :
0

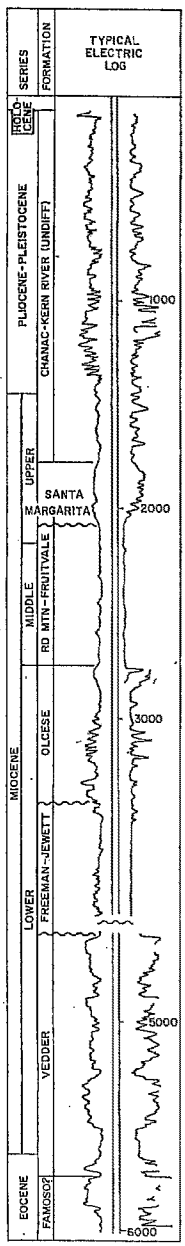
3) Depth of the zone where the injection wells are located:
760' to 2,285' below surface. Zone dips to the Southwest across the field.

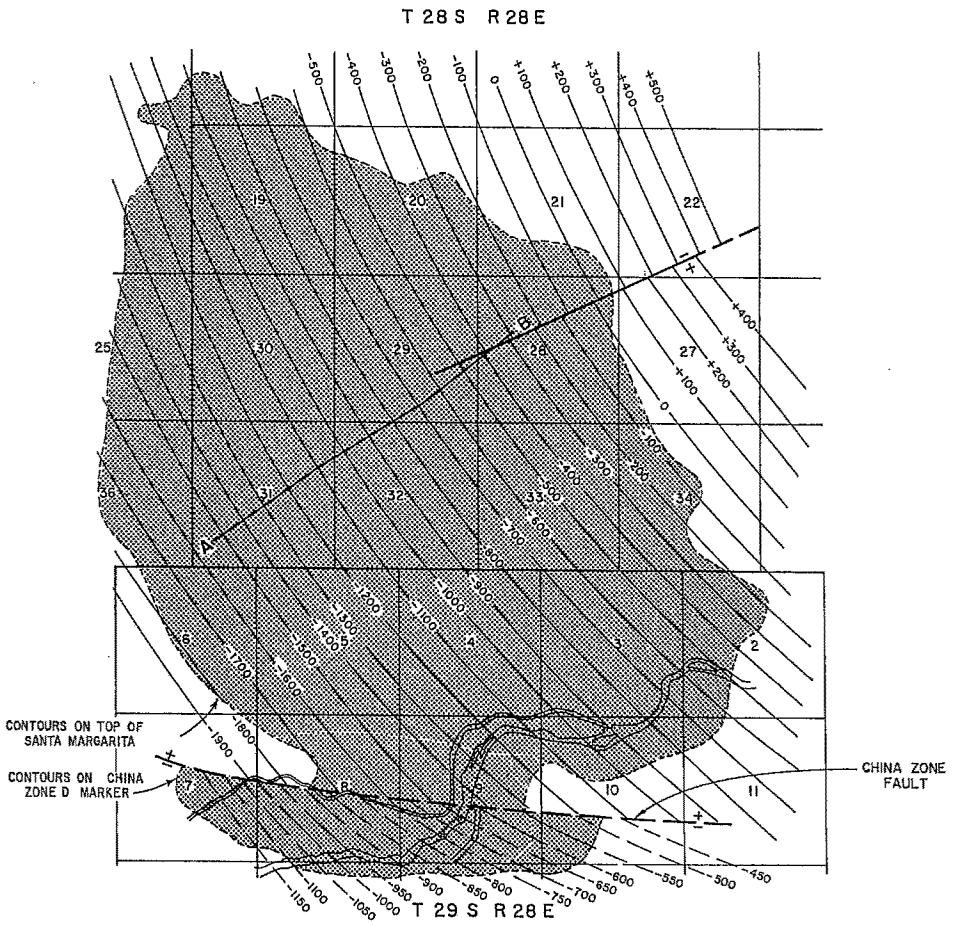
4) Volumes injected historically since 1983:
799,041,272 Bbls, last injected on 3/1/2015

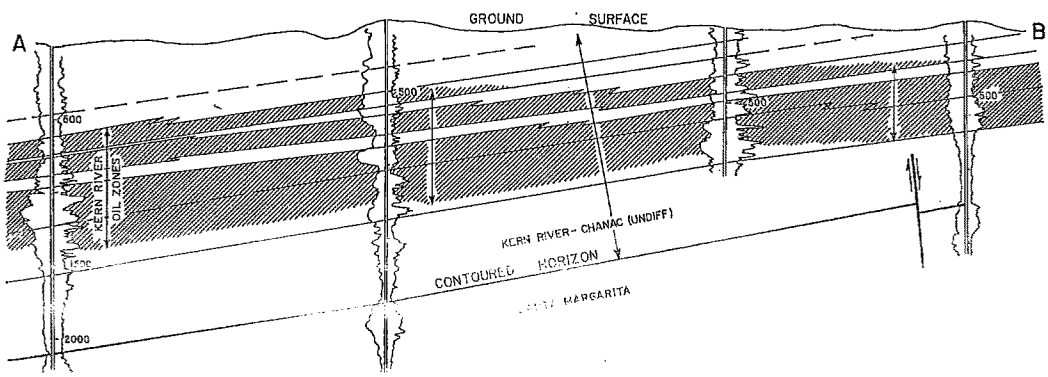
5) TDS of zone:
490 mg/l – 1,584 mg/l TDS
The 490 mg/l TDS sample is from "KCL – 10 Well #2X" (perf 1,068 – 1,196') on 12/30/1985 and the 1,584 mg/l TDS sample is from ""Rambler" 71 W" (perf 1,667-1,875') on 12/22/1965.

6) TDS of injection water:
491 mg/l – 855 mg/l and 74,924 mg/l TDS
The 491 mg/l TDS sample is from the "Jost plant Sec. 10 T29S/28E Waste Disposal Tank" on 11/23/1999, the 855 mg/l TDS sample is from the "Overland plant Sec. 28 T28S/R28E, produced water injection tank" on 11/23/1999, and the 74,924 mg/l is from the "Overland plant Sec. 28 T28S/R28E Brine Disposal Tank" (project 34000035). Permitted fluids for injection into the Santa Margarita zone, Kern River field consist of Kern River produced water, cogeneration and regeneration brine.

KERN RIVER OIL FIELD







LOCATION: 5 miles north of Bakersfield

TYPE OF TRAP: Permeability variations on a homocline

ELEVATION: 400 - 1,000

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Kern River	Elwood Brothers (no name well)	Same as present	3 29S 28E	MD	N.A.	N.A.	1899
China Zone	Westates Petroleum Co. "KCL" 1	Horace Steele and L.C. Gould "KCL" 1	8 29S 28E	MD	50	0	Sep 1947

Remarks: The discovery well was dug by hand in the spring of 1899 on what is now Chanslor-Western Oil Development Co. property. "Gassy vapors" caused the well to be abandoned without a test of its commercial possibilities. In June 1899 McWhorter Bros. drilled the first commercial well 400 feet north of the discovery well.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Standard Oil Co. of Calif. "KCL 26" 1-11	Same	Oct 1948	9 29S 28E	MD	6,986	Granite	Jurassic

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Kern River	900	700	late Pliocene	Kern River	13	5	None
China Zone	1,300	100 - 500	late Pliocene	Kern River	13	40	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
27,154,427	4,165	188,121,732	9,535	4,526	576,511,857	2,599,678	27,154,427	1972	7,942	6,978	9,850

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
Cyclic-steam	1961	300,849,501	5,215
Steam flood	1962	189,380,134	780

SPACING ACT: Does not apply

BASE OF FRESH WATER: 2,500

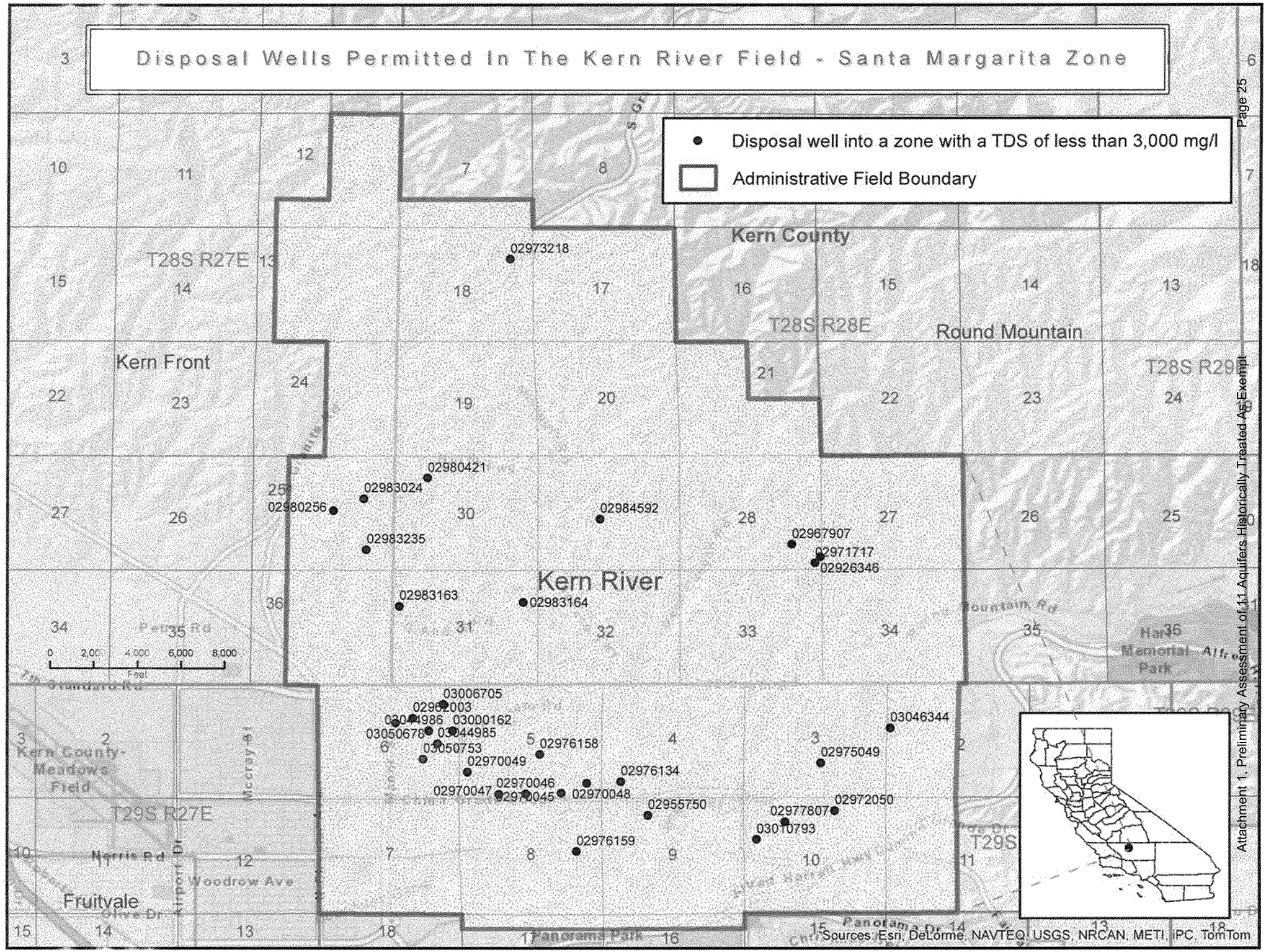
CURRENT CASING PROGRAM: 6 5/8" cem. through zone.

METHOD OF WASTE DISPOSAL: Waste water is injected into the Santa Margarita and Vedder, 12,143,578 bbls. in 1972. Waste water is also used in steam generation. The balance of the water is of a suitable enough quality that it is allowed to enter percolation ponds, irrigation canals, & the Kern River.

REMARKS:

REFERENCES: Crowder, R.E., Kern River Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 38, No. 2 (1952).

Disposal Wells Permitted In The Kern River Field - Santa Margarita Zone



Attachment 1, Preliminary Assessment of 11 Aquifers Historically Treated As Exempt

Mount Poso Field, Walker Zone, East Side Bakersfield District

1) Number of disposal wells permitted in the zone:
   5

2) Number of active producers in the zone :
   0

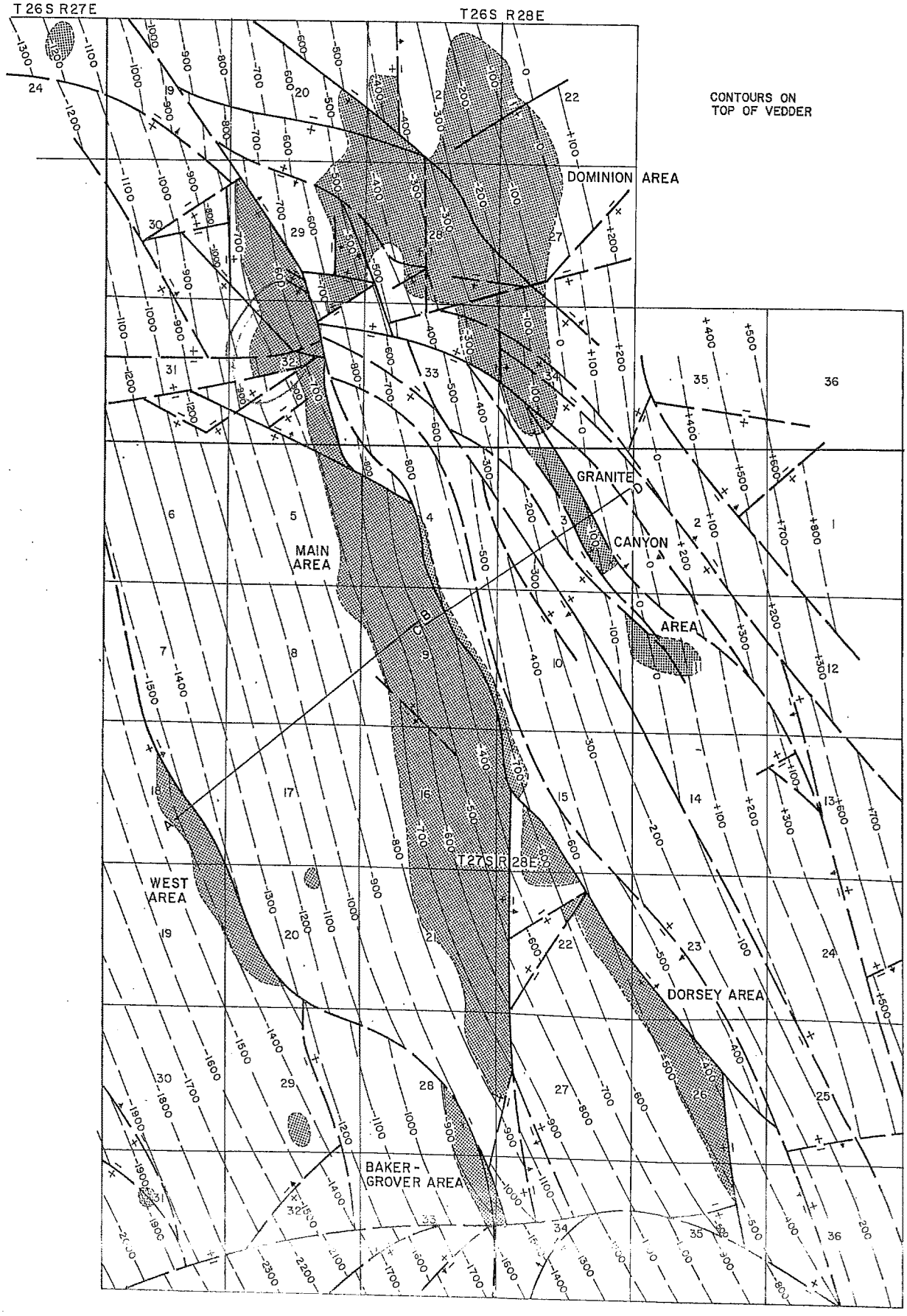
3) Depth of the zone where the injection wells are located:
   1,740' to 1,796' below surface (top of the Vedder/Walker zone). Injected only in combination with the laterally interfingered Vedder, which extends throughout the field.

4) Volumes injected historically since 1983:
   63,777,556 Bbls, last injected on 3/1/2015

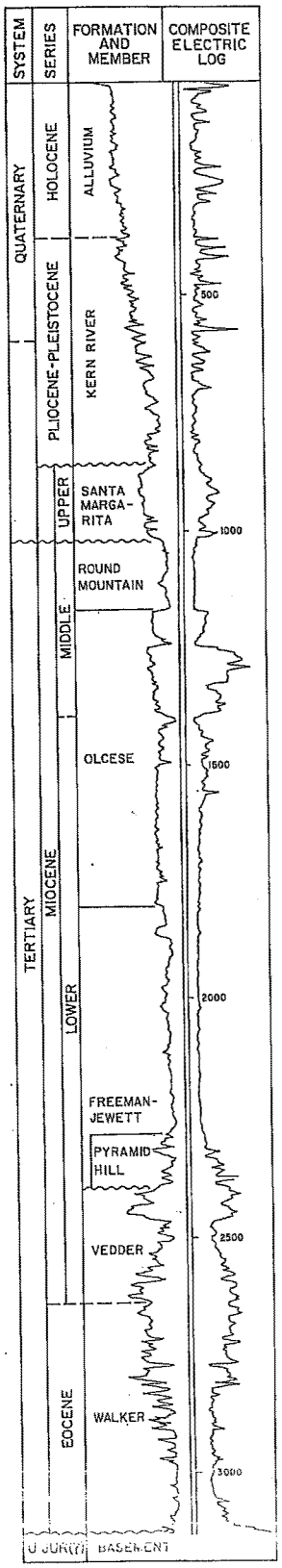
5) TDS of zone :
   1,069 mg/l TDS
   The 1,069 mg/l TDS zone sample is from "Black Foot Sump" on 05/31/1973.

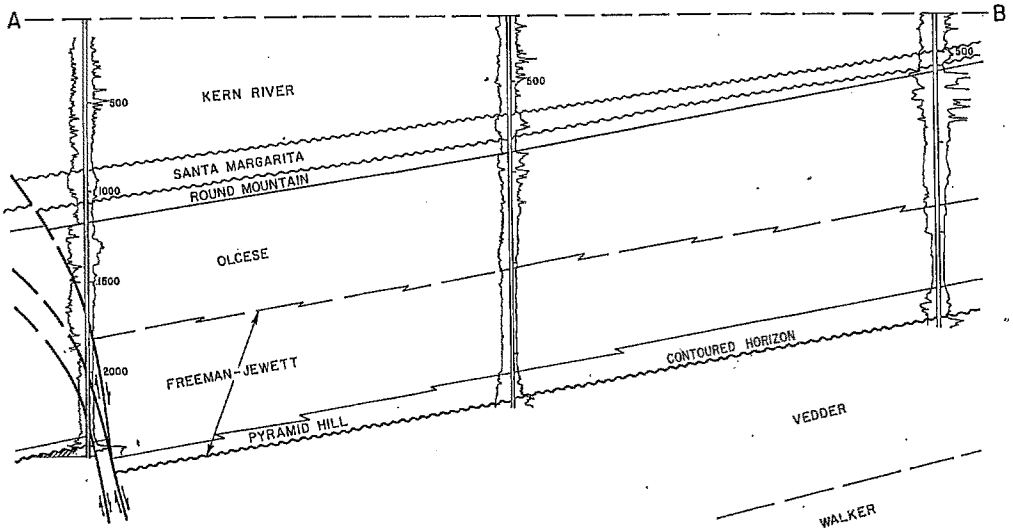
6) TDS of injection water:
   650 mg/l TDS
   The 650 mg/l TDS sample is from "Shapiro 234 Water Sample from Water Disposal" on 12/4/2008.

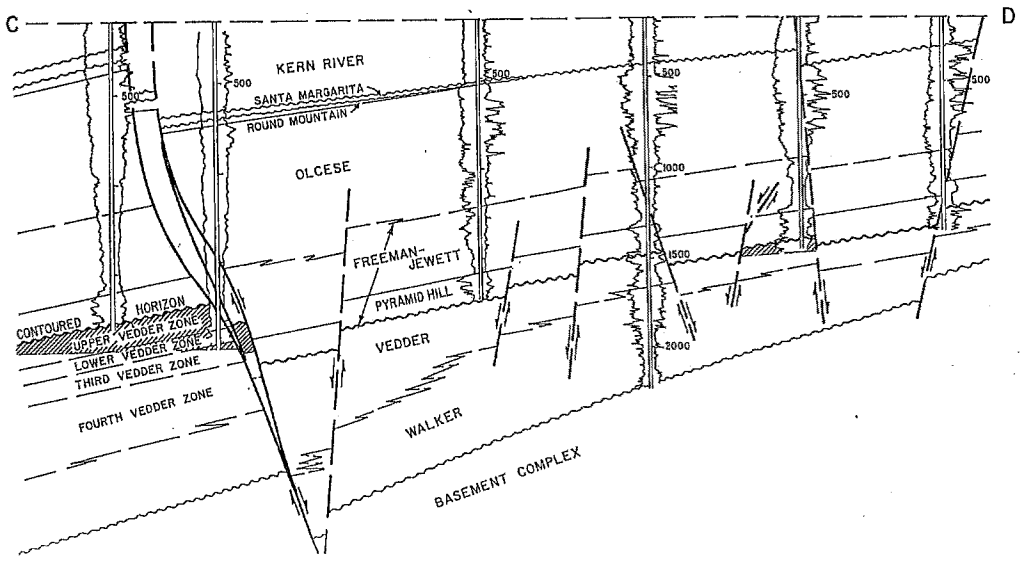
MOUNT POSO OIL FIELD



MOUNT POSO OIL FIELD







LOCATION: 13 miles northeast of Bakersfield

TYPE OF TRAP: See areas

ELEVATION: 650 - 1,450

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production Oil (bbl)	Initial daily production Gas (Mcf)	Date of completion
Pyramid Hill and Upper Vedder	Shell Oil Co. "Vedder" 1	Shell Co. of California "Vedder" 1	9 27S 28E	MD	300	N.A.	Jul 1926

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Pacific Oil and Gas Dev. Corp. "City of San Francisco" 56-32	Same	Aug 1957	32 27S 28E	MD	3,759	Walker	Eocene

PRODUCING ZONES (See areas)

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
1,830,017	728	84,316,129	3,630	532	164,558,017	1,977,245	8,427,304	1943	1,184	828	3,805

STIMULATION DATA (Jan. 1, 1973) (See areas)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection

SPACING ACT: See areas.

BASE OF FRESH WATER: See areas.

CURRENT CASING PROGRAM: See areas.

METHOD OF WASTE DISPOSAL: See areas.

REMARKS:

REFERENCES: Albright, M.B., A.G. Hluza, and J.C. Sullivan, Mount Poso Oil Field, Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 43, No. 2 (1957).

LOCATION. See map sheet of Mount Poso Oil Field

TYPE OF TRAP: Faulted regional homocline

ELEVATION: 650 - 1,050

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Upper Vedder	Emjayco "Baker" 1	Baker-Grover Co. "Baker" 1	33 27S 28E	MD	250	N.A.	Jul 1935

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
The White Hills Oil Co. No. 1	Ralph R. Whitehill No. 1	Apr 1961	34 27S 28E	MD	2,483	Vedder	early Mio

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Upper Vedder	1,750	25	early Miocene	Vedder	15	190	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
9,991	0	883,158	80	4	3,700,652	0	276,899	1937	49	23	90

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: 1,100

CURRENT CASING PROGRAM: 7" cem. above zone; 5 1/2" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps (to be phased out).

REMARKS:

REFERENCES

LOCATION: See map sheet of Mount Poso Oil Field

TYPE OF TRAP: Faulted homocline; lithofacies variations

ELEVATION: 1,100 - 1,350

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Vedder	Robert B. Doe, "Dominion" 2	A. Bruce Frame "Dominion" 2	28 26S 28E	MD	435	N.A.	Dec 1928

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Glen H. Mitchell "SP" 1	Same	May 1945	33 26S 28E	MD	2,512	Schist	Late Jur

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Vedder	1,560	35	early Miocene	Vedder	15	10	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
107,317	0	4,482,093	675	74	5,735,208	0	197,189	1933	195	128	690

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
Cyclic-steam	1964	177,242	12

SPACING ACT: Does not apply

BASE OF FRESH WATER: No saline waters present

CURRENT CASING PROGRAM: 7" cem. above zone; 5 1/2" liner landed through zone.

METHOD OF WASTE DISPOSAL: Injection into the Vedder; evaporation and percolation sumps.

REMARKS:

REFERENCES:

LOCATION: See map sheet of Mount Poso Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION. 900 - 1,250

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production		Date of completion
					Oil (bbl)	Gas (Mcf)	
Upper Vedder	Thomas Oil Co. "Dorsey" 2	R.S. Lytle "Dorsey" 2	26 27S 28E	MD	570	N.A.	Sep 1928

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth	
						Strata	Age
Emjayco "Glide" 15-1	Harry H. Magee, Opr. "Glide" 15-1	Oct 1956	15 27S 28E	MD	2,000	Vedder	early Mio

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic		Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
			Age	Formation			
Upper Vedder	1,500	30	early Miocene	Vedder	16	5	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production			1972 Proved acreage	1972 Average number producing wells	Cumulative production		Peak oil production		Total number of wells		Maximum proved acreage
Oil (bbl)	Net gas (Mcf)	Water (bbl)			Oil (bbl)	Gas (Mcf)	Barrels	Year	Drilled	Completed	
86,429	0	1,913,270	375	47	4,676,008	0	204,880	1958	142	76	410

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Does not apply

BASE OF FRESH WATER: Basement

CURRENT CASING PROGRAM: 8 5/8" cem. above zone; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Percolation and evaporation sumps on outcrop of Round Mountain Silt; injection wells.

REMARKS: Vedder zone water contains 1.75 ppm boron.

REFERENCES:

CALIFORNIA DIVISION OF OIL AND GAS

MOUNT POSO OIL FIELD

GRANITE CANYON AREA

Kern County

LOCATION: See map sheet of Mount Poso Oil Field

TYPE OF TRAP: Faulted homocline; lithofacies variations

ELEVATION: 1,300

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Upper Vedder	Road Oil Sales, Inc. "SP" 2	J.J. Chevalier "Southern Pacific" 2	3 27S 28E	MD	50	N.A.	Nov 1936

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Lyle A. Garner & Assoc. "S.P." 3-1	Same	May 1952	3 27S 28E	MD	2,226	Granite	Late Jur

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Upper Vedder	1,390	30	early Miocene	Vedder	15	10	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
3,808	0	20,675	80	10	823,450	0	65,780	1949	65	30	130

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: Basement

CURRENT CASING PROGRAM: 8 5/8" cem. above zone; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation sumps on outcrop of Round Mountain Silt.

REMARKS: A cyclic-steam project was started in 1967 and discontinued after 19,069 bbls. of water in the form of steam were injected. A pilot fire flood project, initiated in 1963, was terminated in 1965.

REFERENCES:

LOCATION: See map sheet of Mount Poso Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 700 - 1,450

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Pyramid Hill and Upper Vedder	Shell Oil Co. "Vedder" 1	Shell Oil Co. of Calif. "Vedder" 1	9 27S 28E	MD	300	N.A.	Jul 1926
Lower Vedder [A]	Shell Oil Co. "Vedder" 6	Same as present	9 27S 28E	MD	835	N.A.	Jan 1933
Third Vedder	Unknown	Unknown	4 27S 28E or 9	MD	N.A.	N.A.	Prior to 1957
Fourth Vedder [B]	Shell Oil Co. "Glide" 6	Same as present	15 27S 28E	MD	134	N.A.	Aug 1957

Remarks: The first separate well that produced from the Pyramid Hill zone was Shell Oil Co. "Security" 3, Sec. 9, T. 27S., R. 28E. Initial production was 4 barrels per day.
[A] Commingled production from Upper Vedder and Lower Vedder.
[B] Commingled production from Third Vedder and Fourth Vedder.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Trico Industries, Inc. "USL" 6-2	Trico Oil and Gas Co. "USL" 6-2	Jul 1960	6 27S 28E	MD	2,665	Vedder	early Mio

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Pyramid Hill	1,600	160	early Miocene	Pyramid Hill	17	N.A.	None
Upper Vedder	1,750	140	early Miocene	Vedder	16	80	None
Lower Vedder	1,900	80	early Miocene	Vedder	16	N.A.	None
Third Vedder	1,985	120	early Miocene	Vedder	16	75	None
Fourth Vedder	2,105	50	early Miocene	Vedder	16	65	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
1,590,436	728	75,595,054	2,225	374	146,734,300	1,977,245	7,982,576	1943	641	524	2,265

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
Steam flood	1963	9,351,042	11

SPACING ACT: Does not apply

BASE OF FRESH WATER: 1,000 - 1,500

CURRENT CASING PROGRAM: 8 5/8" cem. above zone and across base of fresh-water sands; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps; injection into Vedder sand.

REMARKS: A cyclic-steam project was started in 1963 and discontinued after 116,623 bbls. of water in the form of steam was injected. A water flood project was started in 1952 and discontinued after 608,470 bbls. of water was injected.

REFERENCES:

CALIFORNIA DIVISION OF OIL AND GAS

WEST AREA

MOUNT POSO OIL FIELD

Kern County

LOCATION: See map sheet of Mount Poso Oil Field

TYPE OF TRAP: Faulted homocline with permeability variations

ELEVATION: 700 - 1,075

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Upper Vedder	Thomas Oil Co. "Ring 18" 1	Dwight G. Vedder No. 1	18 27S 28E	MD	0	5,300	Dec 1943

Remarks: Gas cap was of limited volume. After being shut in for one year the discovery well was recompleted producing oil.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Pacific Oil & Gas Dev. Corp. "City of San Francisco" 56-32	Same	Aug 1957	32 27S 28E	MD	3,759	Walker	Eocene

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Upper Vedder	2,575	15 - 50	early Miocene	Vedder	16	60	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
32,036	0	1,421,879	195	23	2,888,399	0	190,765	1957	92	47	220

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

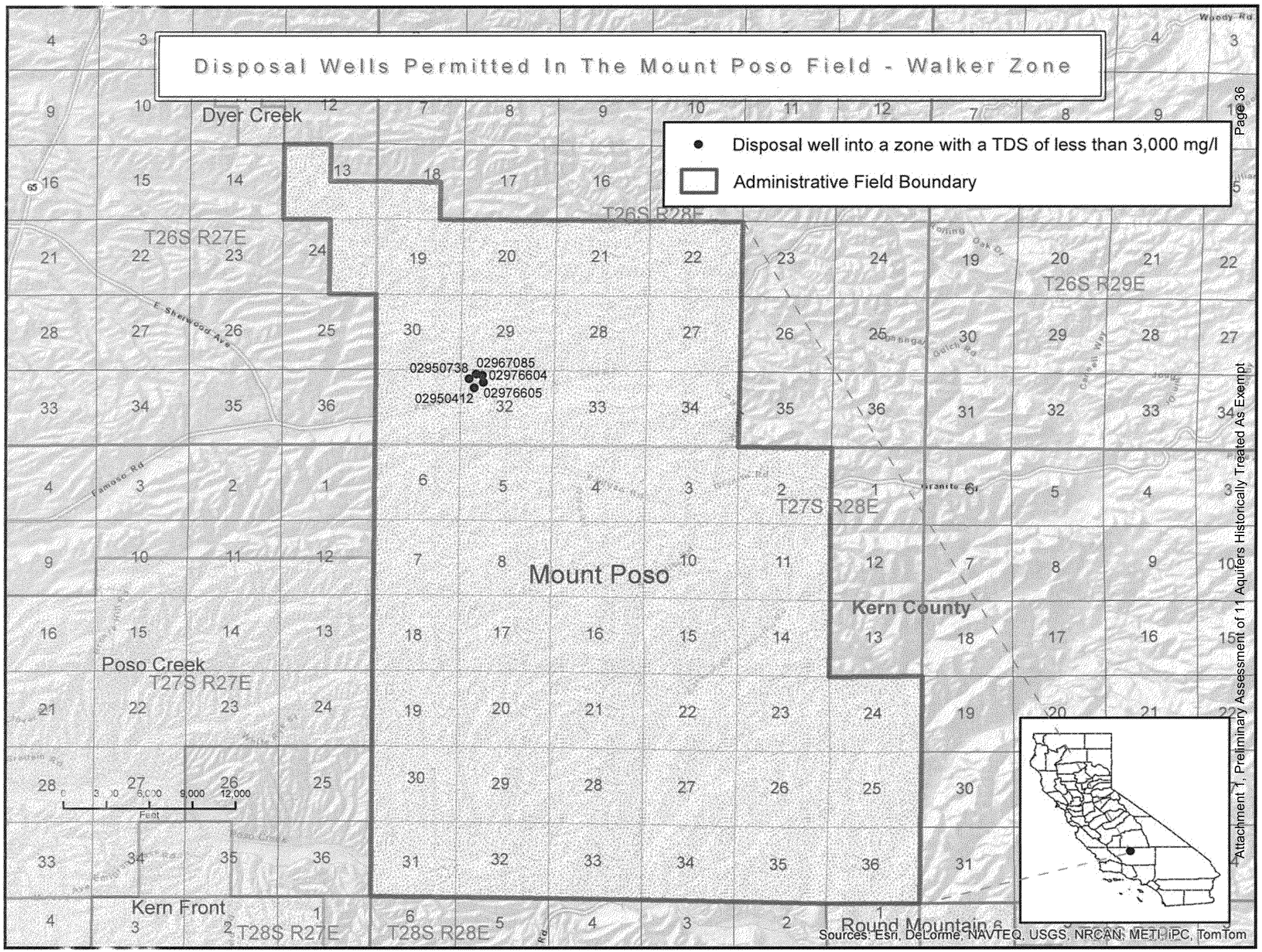
BASE OF FRESH WATER: 1,800

CURRENT CASING PROGRAM: 7" cem. above zone and across base of fresh-water sands; 5 1/2" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps (to be phased out).

REMARKS: Vedder zone water contains 3 to 4 ppm boron.

REFERENCES:


Disposal Wells Permitted In The Mount Poso Field - Walker Zone
Disposal well into a zone with a TDS of less than 3,000 mg/l
Administrative Field Boundary
Dyer Creek
T26S R27E
T26S R28E
T26S R29E
T27S R27E
T27S R28E
T28S R27E
T28S R28E
Mount Poso
Kern County
Poso Creek
Kern Front
Round Mountain
02950738
02967085
02976604
02950412
02976605
0 3,000 6,000 9,000 12,000
Feet
Sources: Esri, DeLorme, NAVTEQ, USGS, NRCAN, METI, iPC, TomTom

Round Mountain Field, Olcese Zone, East Side Bakersfield District

1) Number of disposal wells permitted in the zone:
   6 (4 wells are permitted in both the Olcese and Walker Zones in Round Mountain Field)

2) Number of active producers:
   0

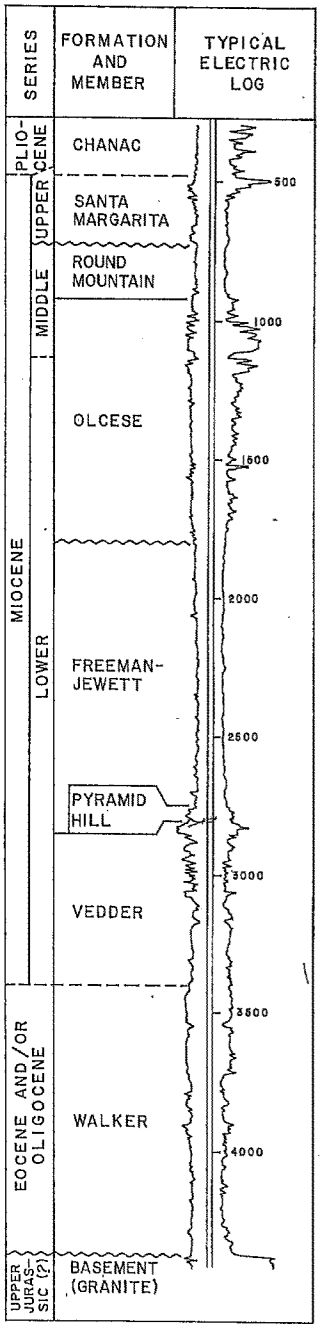
3) Depth of the zone where the injection wells are located:
   710' to 850' below surface. These zone depths are from wells API #029-18114 and API #029-18119, which are currently injecting in the Olcese zone. The remaining wells in the field (029-47441, 029-47543, 030-51960 and 030-51959) are permitted to inject in the Olcese, Freeman-Jewett, Vedder and Walker but are currently perforated in the Vedder and/or Walker zones only. For these 4 wells there are no logs available that pick the top of the Olcese zone since there is no injection there. Zone is fault bounded 1 ½ miles east of field limits, and pinches out 5 miles west of field limits.

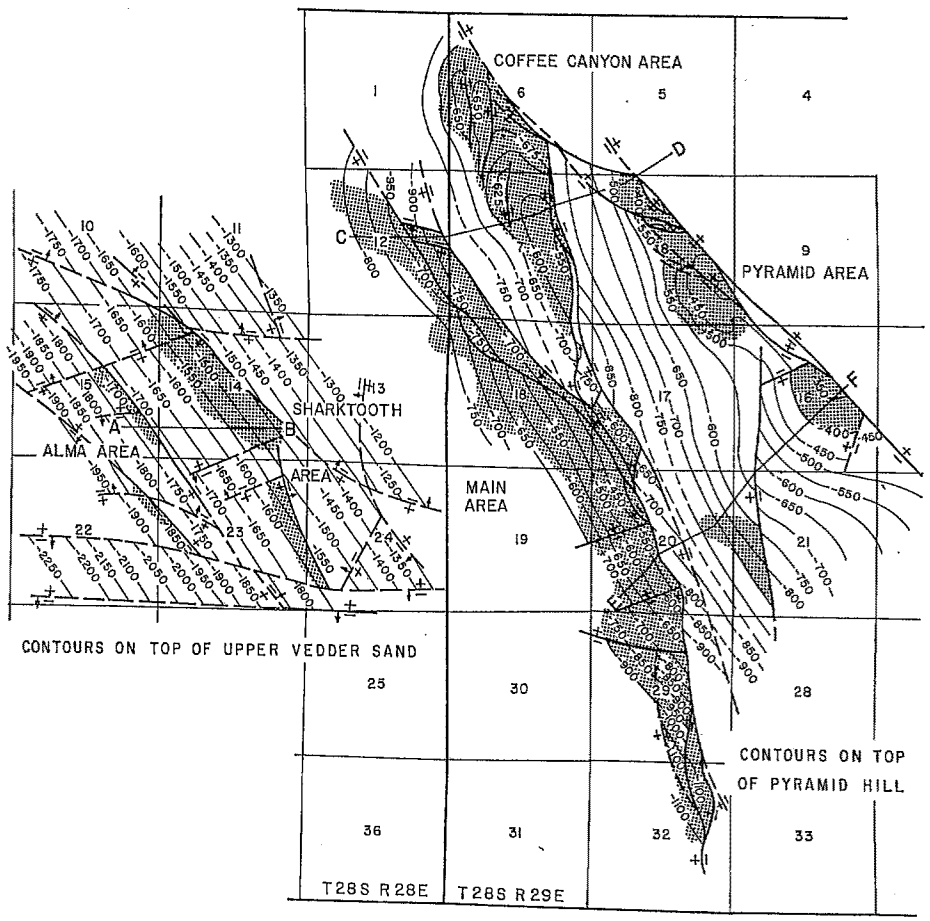
4) Volumes injected historically since 1983:
   160,798,008 Bbls, last injected on 1/1/2015

5) TDS of zone:
   2,693 mg/l TDS
   Sample collected from "water from Bishop #6 Bailer Sample at 600'" on 4/27/1974.

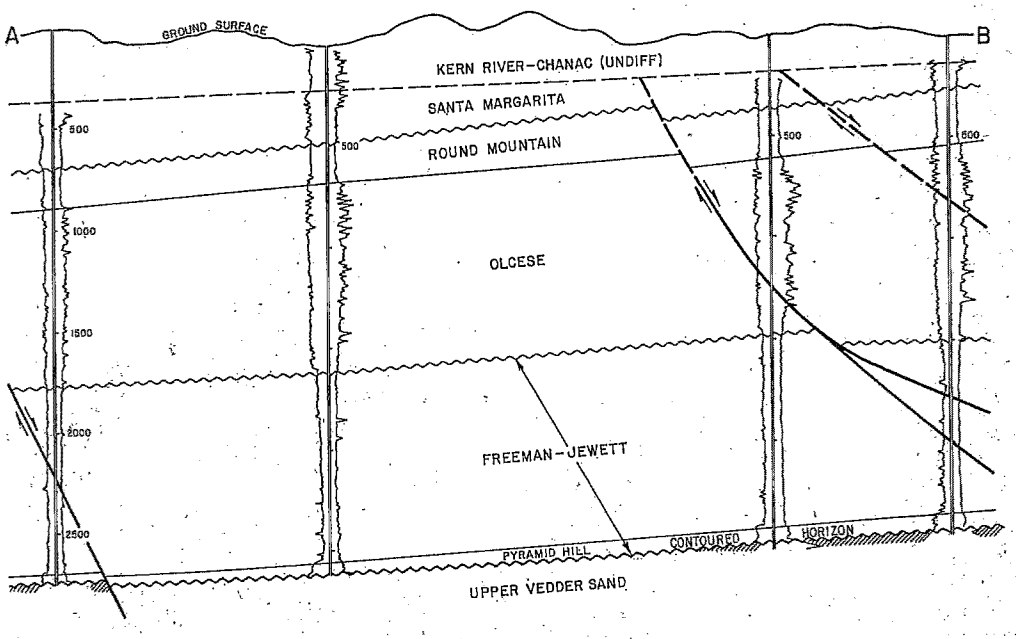
6) TDS of injection water:
   1,900 mg/l TDS
   Sample collected from "Sec. 20 produced water" (Olcese WD#342 & 343) on 2/23/2009. Permitted fluids for injection into the Olcese Zone in Round Mountain field consist of Pyramid Hill, Jewett, Freeman-Jewett and Vedder zones.

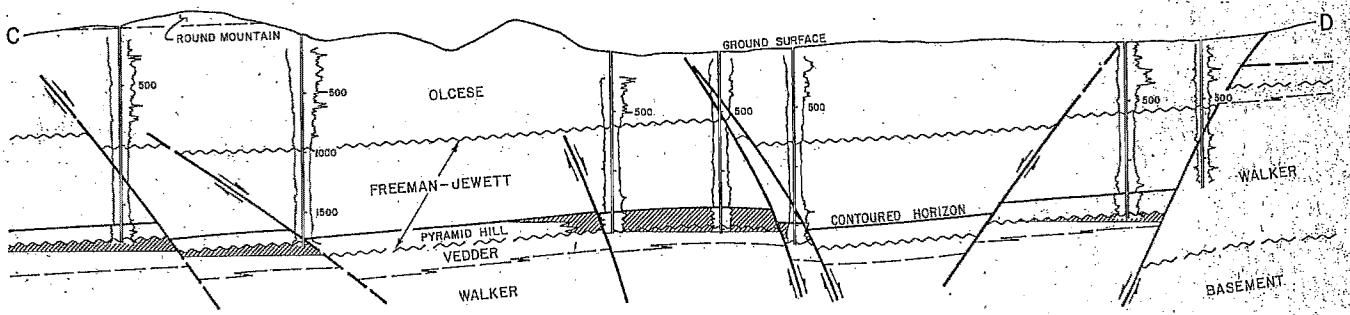
ROUND MOUNTAIN OIL FIELD

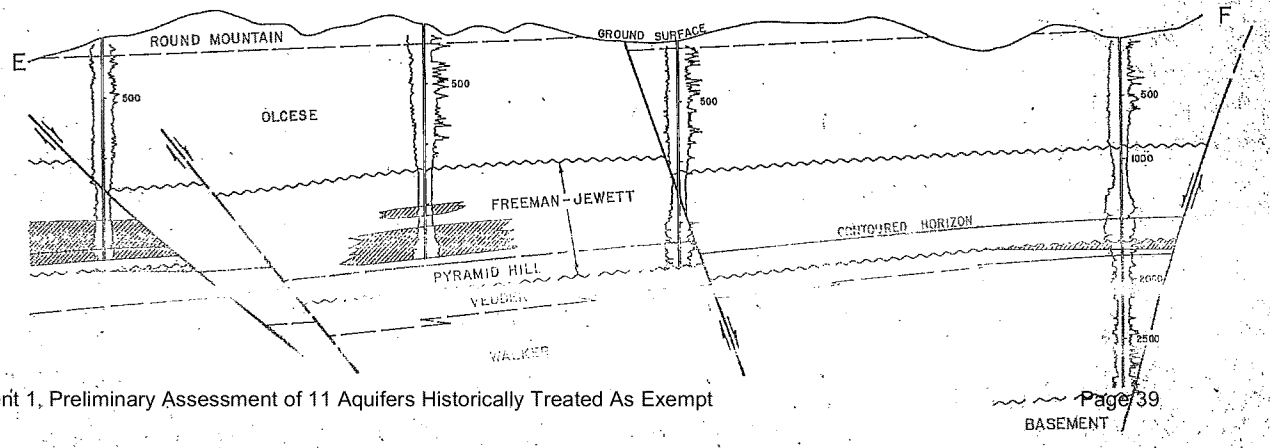




ROUND MOUNTAIN OIL FIELD







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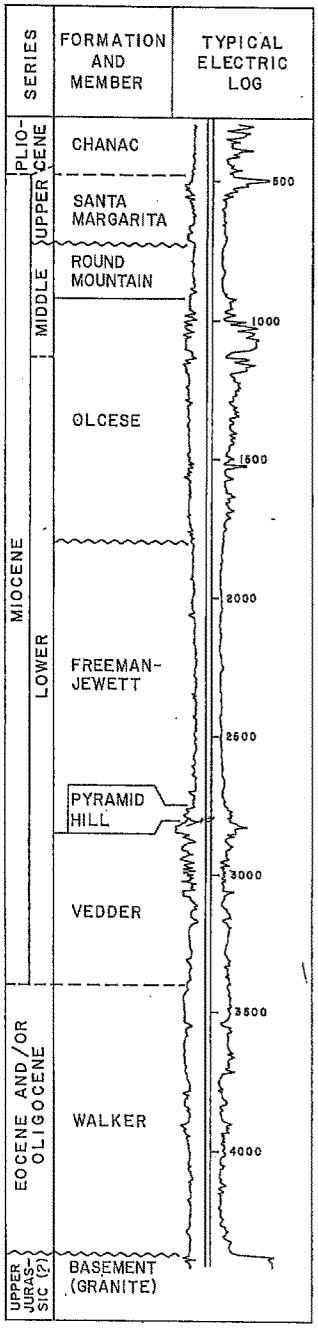
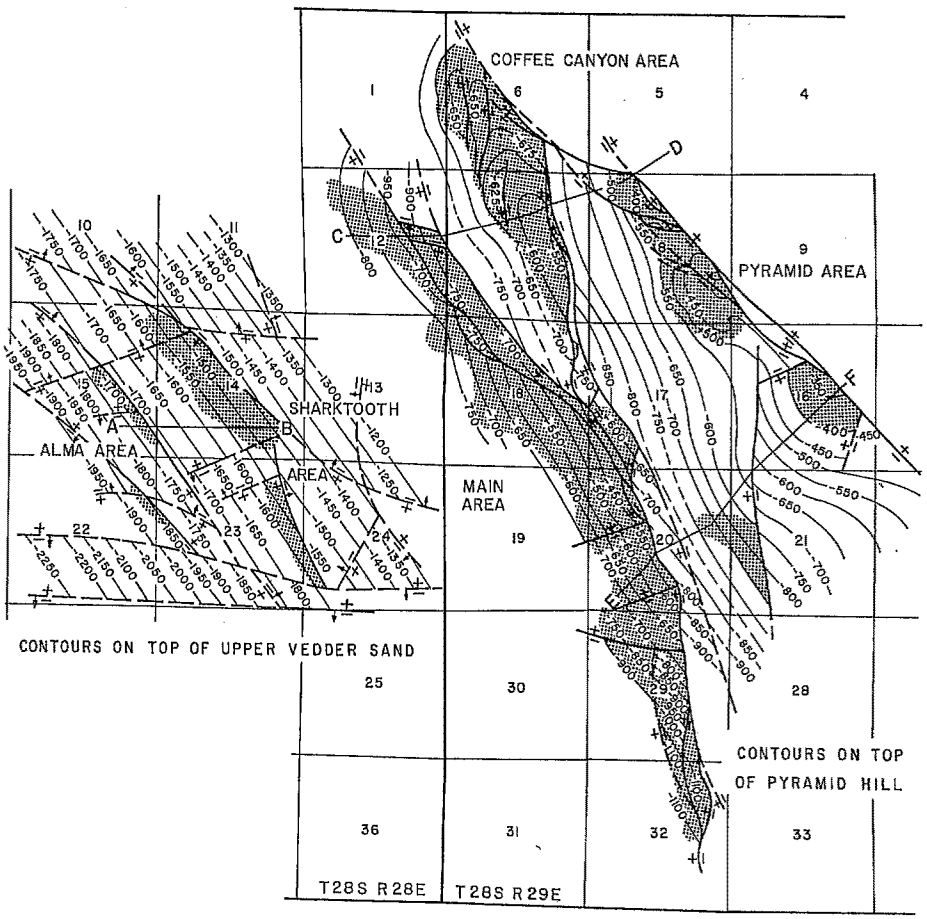




LOCATION: 14 miles northeast of Bakersfield

TYPE OF TRAP: See areas

ELEVATION: 600 - 1,500

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Jewett	Getty Oil Co. No. 2	Elbe Oil Land Dev. Co. No. 2	20 28S 29E	MD	*204	N.A.	May 1927
Pyramid Hill	Same as above	Same as above	20 28S 29E	MD	N.A.	N.A.	May 1927
Vedder	Same as above	Same as above	20 28S 29E	MD	N.A.	N.A.	May 1927

Remarks: * Production listed for Jewett is the combined production rate from the Jewett, Pyramid Hill, and Vedder zones.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	S & M	Depth (feet)	At total depth: Strata	At total depth: Age
C.C. Killingsworth "Alma" 6	Barnsdall Oil Co. "Alma" 6	Mar 1948	15 28S 28E	MD	4,418	Basement (Granite)	Late Jur (?)

PRODUCING ZONES (See areas)

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
711,406	46,635	48,630,496	2,435	292	89,199,121	1,424,213	5,453,194	1938	665	468	2,590

STIMULATION DATA (Jan. 1, 1973) (See areas)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection

SPACING ACT: See areas.

BASE OF FRESH WATER: See areas.

CURRENT CASING PROGRAM: See areas.

METHOD OF WASTE DISPOSAL: See areas.

REMARKS:

REFERENCES: See areas.

CALIFORNIA DIVISION OF OIL AND GAS

ALMA AREA

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 700 - 1,270

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Vedder	Harold C. Morton & H.S. Kohlbush "Alma" 1	Same as present	15 28S 28E	MD	152	N.A.	Feb 1947

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
C.C. Killingsworth "Alma" 6	Barnsdall Oil Co. "Alma" 6	Mar 1948	15 28S 28E	MD	4,418	Basement (Granite)	Late Jur.

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Vedder	2,600	15	early Miocene	Vedder	13	N.A.	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
6,240	0	107,447	50	3	598,904	0	113,392	1948	47	21	80

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: None

CURRENT CASING PROGRAM: 8 5/8" cem. above zone; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps on outcrops of the Round Mountain Silt.

REMARKS:

REFERENCES: Albright, M.B. Jr., Sharktooth and Alma Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 42, No. 1 (1956).

CALIFORNIA DIVISION OF OIL AND GAS

COFFEE CANYON AREA

ROUND MOUNTAIN OIL FIELD

Kern County

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 690 - 1,300

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production Oil (bbl)	Initial daily production Gas (Mcf)	Date of completion
Pyramid Hill	Acacia Oil Co. "Coffee" 1	Reynolds Oil and Gas Co. No. 1	6 28S 29E	MD	*600	N.A.	Sep 1928
Vedder	Acacia Oil Co. "Lindsay" 1	Lindsay Oil Co. No. 1	6 28S 29E	MD	800	N.A.	Aug 1928

Remarks: * Production is commingled from Pyramid Hill and Vedder.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Richard S. Rheem, Opr. "Smoot-Vedder" 2	Same	May 1957	1 28S 28E	MD	2,313	Vedder	early Mio

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Pyramid Hill	1,500	150	early Miocene	Jewett	18	50	None
Vedder	1,650	30	early Miocene	Vedder	16	75	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
103,176	0	7,292,707	435	50	18,507,039	67,567	1,857,108	1937	133	104	475

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
Water flood	1960	3,815,746	1

SPACING ACT: Does not apply

BASE OF FRESH WATER: 0 - 200

CURRENT CASING PROGRAM: 7" cem. above zone; 5 1/2" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps on outcrops of the Round Mountain Silt.

REMARKS: A cyclic-steam injection project in the Pyramid Hill and Vedder zones was started in 1965 and terminated in 1968. Cumulative injection totals 12,200 bbls. The Pyramid Hill zone was originally known as the Elbe zone.

REFERENCES: Park, W.H., J.R. Weddle, J.A. Barnes, Main Coffee Canyon and Pyramid Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 49, No. 2 (1963).

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 600 - 1,500

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Jewett	Getty Oil Co. No. 2	Elbe Oil Land Dev. Co. No. 2	20 28S 29E	MD	*204	N.A.	May 1927
Pyramid Hill	Same as above	Same as above	20 28S 29E	MD	N.A.	N.A.	May 1927
Vedder	Same as above	Same as above	20 28S 29E	MD	N.A.	N.A.	May 1927

Remarks: * Production listed for Jewett is the combined production rate from the Jewett, Pyramid Hill, and Vedder zones.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Shell Oil Co. "Jewett" 3	Same	Jun 1928	29 28S 29E	MD	2,678	Walker	Eo &/or Olig

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Jewett	1,600	130	early Miocene	Freeman-Jewett	22	N.A.	None
Pyramid Hill	1,900	150	early Miocene	Jewett	18	N.A.	None
Vedder	2,000	80	early Miocene	Vedder	16	95	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
510,916	46,561	35,953,284	1,415	171	59,572,216	1,293,959	3,794,620	1938	302	225	1,465

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Does not apply

BASE OF FRESH WATER: None

CURRENT CASING PROGRAM: 7" cem. above zone; 5 1/2" liner landed through zone.

METHOD OF WASTE DISPOSAL: 4,845,286 bbl. of waste water was injected during 1972 into two disposal wells; percolation and evaporation sumps on outcrops of the Round Mountain Silt.

REMARKS: A water flood project in the Vedder zone was started in 1961 and terminated in 1963. Cumulative injection totals 872,587 bbls.

REFERENCES: Park, W.H., J.R. Nebble, J.A. Barnes, Main, Coffee Canyon, and Pyramid Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 49, No. 2 (1963).

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 730 - 1,470

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Pyramid Hill	Thomas Oil Co. "Olcese" 2	Harp & Brown "Olcese" 2	17 28S 29E	MD	5	0	May 1944
Vedder	Crestmont Oil Co. "Olcese" 1	Eastmont Oil Co. "Olcese" 1	16 28S 29E	MD	250	N.A.	May 1937
Walker	Crestmont Oil Co. "Staley" 11	Same as present	8 28S 29E	MD	40	N.A.	Jul 1943

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Piute Holding Co. "Smith" 1	Same	Oct 1929	17 28S 29E	MD	3,110	Walker	Eo &/or Olig

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Pyramid Hill	1,250	130	early Miocene	Jewett	18	50	None
Vedder	1,390	40	early Miocene	Vedder	16	80 - 110	None
Walker	1,535	50	Eo &/or Olig	Walker	20	N.A.	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
55,714	74	1,527,767	290	37	5,692,349	6,876	378,882	1946	98	60	300

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: None

CURRENT CASING PROGRAM: 8 5/8" or 7" cem. above zone; 6 5/8" or 5" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps on outcrops of the Round Mountain Silt.

REMARKS:

REFERENCES: Park, W.H., J.R. Weddle, J.A. Barnes, Main, Coffee Canyon, and Pyramid Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 49, No. 2 (1963).

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 700 - 1,300

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Vedder	G M V Oil Co. "Signal-Mills" 1	Bandini Petroleum Co. "Signal Mills" 1	24 28S 28E	MD	214	N.A.	Sep 1943

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Mobil Oil Corp. "Bradford" 1	General Petroleum Corp. "Bradford" 1	Jun 1943	15 28S 28E	MD	2,995	Vedder	early Mio

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Vedder	2,400	25	early Miocene	Vedder	13	N.A.	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
35,360	0	3,749,291	245	31	4,828,613	55,811	503,449	1947	85	58	270

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: None

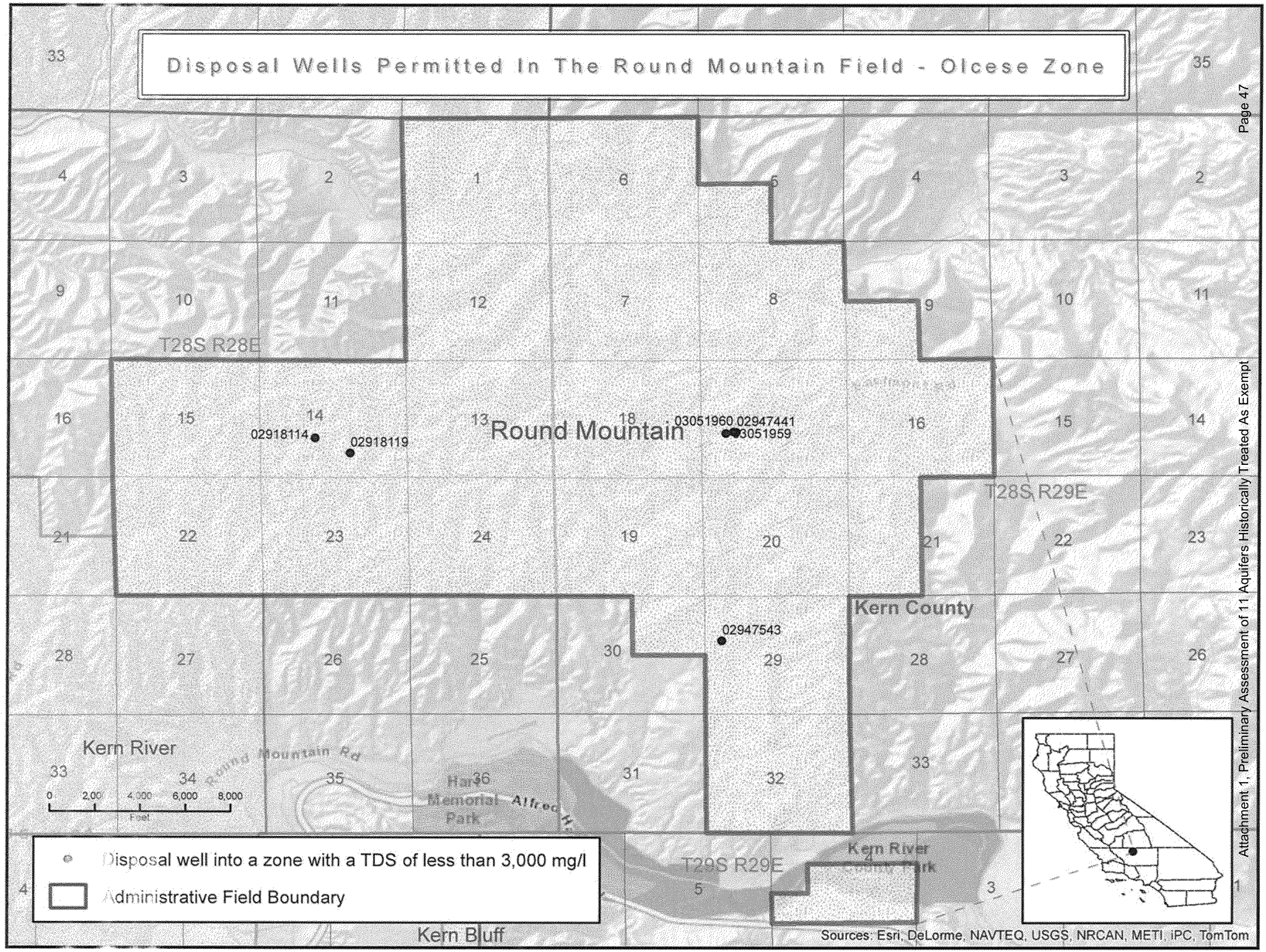
CURRENT CASING PROGRAM: 8 5/8" cem. above zone; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps on outcrops of the Round Mountain Silt.

REMARKS:

REFERENCES: Albright, M.B. Jr., Sharktooth and Alma Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas. Summary of Operations--Calif. Oil Fields, Vol. 42, No. 1 (1956).

Disposal Wells Permitted In The Round Mountain Field - Olcese Zone



Attachment 1, Preliminary Assessment of 11 Aquifers Historically Treated As Exempt

Round Mountain Field, Walker Zone, East Side Bakersfield District

1) Number of disposal wells permitted in the zone:
   30 (4 of these are permitted in both the Olcese and Walker Zones in Round Mountain Field). There are 2 gas disposal wells.

2) Number of active producers:
   4 wells (Note that although this aquifer was historically treated as exempt as a non-hydrocarbon producing formation, the Walker zone within the field has current production.)

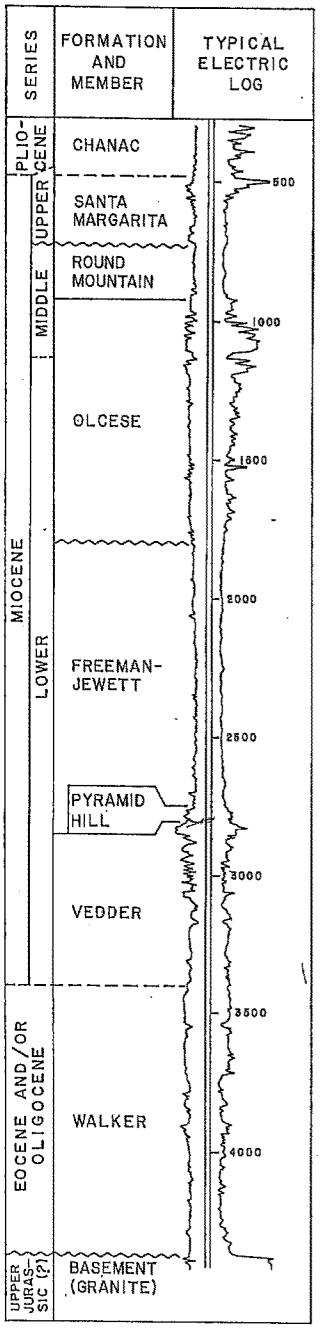
3) Depth of the zone where the disposal wells are located:
   1,890' to 2,590' below surface

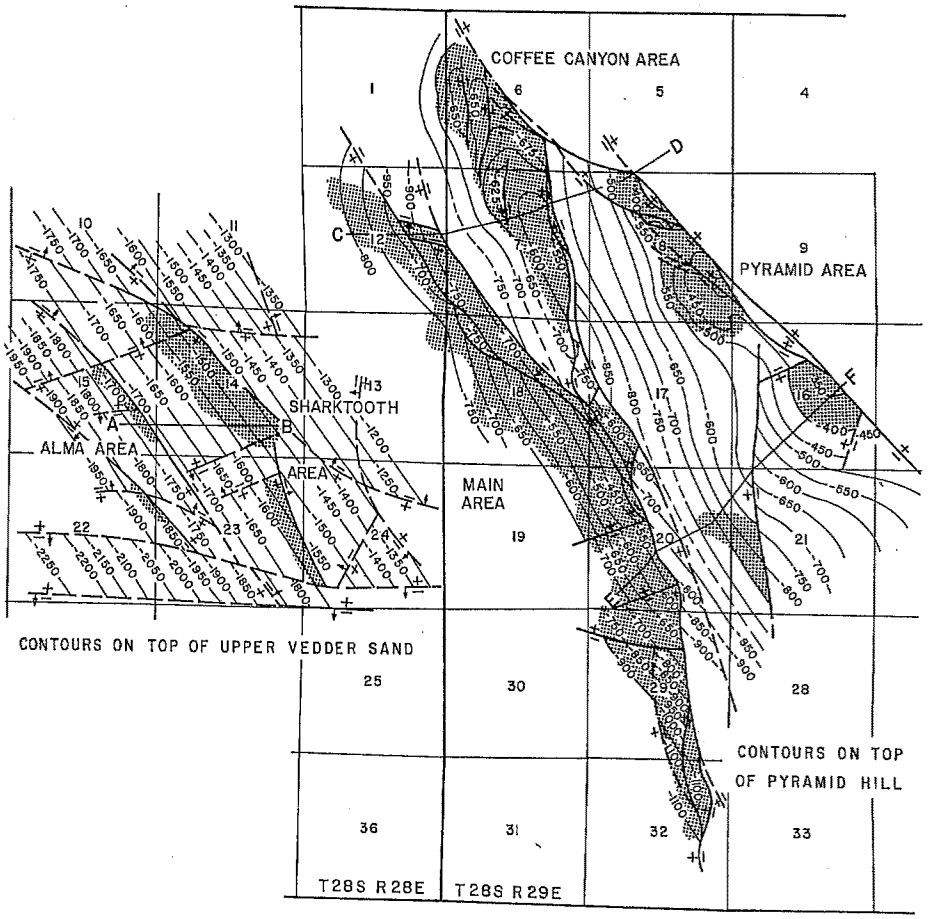
4) Volumes injected historically since 1983:
   1,529,910,014 Bbls, last injected on 3/1/2015

5) TDS of zone:
   2,335 mg/l TDS
   Sample 2,335 mg/l TDS is from "Walker zone formation water" (Round Mountain WD 1-20) on 10/17/1983.

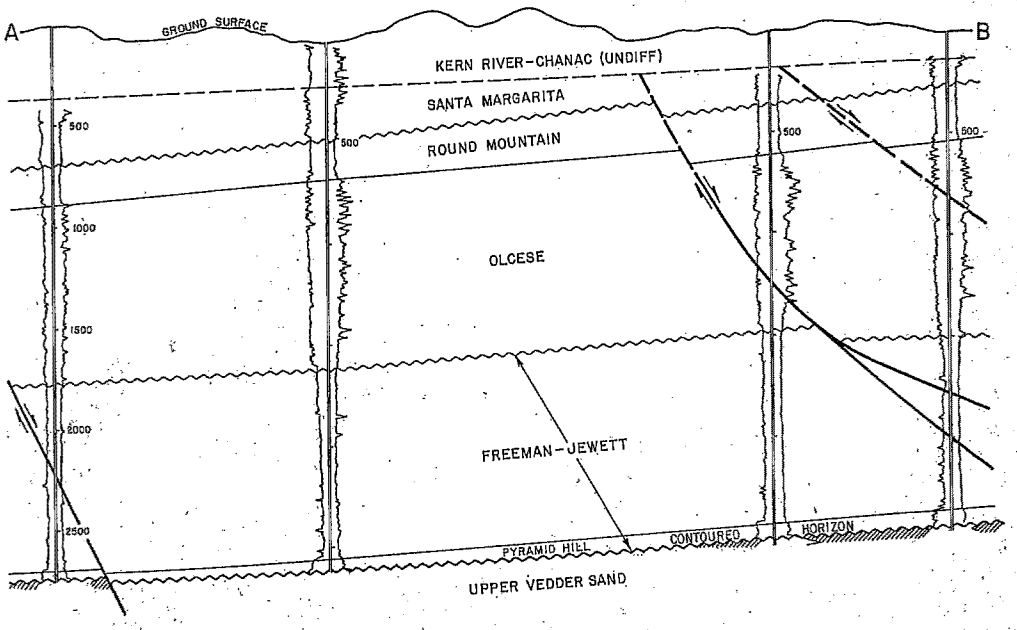
6) TDS of injection water:
   1,600 – 2,900 mg/l TDS
   The 1,600 mg/l TDS sample is from "NAM Produced water (West signal #8) on 1/1/2009 and the 2,900 mg/l TDS sample is from "18 -WD7" on 9/20/2012. Permitted fluids for injection into the Walker Zone in Round Mountain field consist of Pyramid Hill, Jewett, Freeman-Jewett and Vedder zones production fluid.

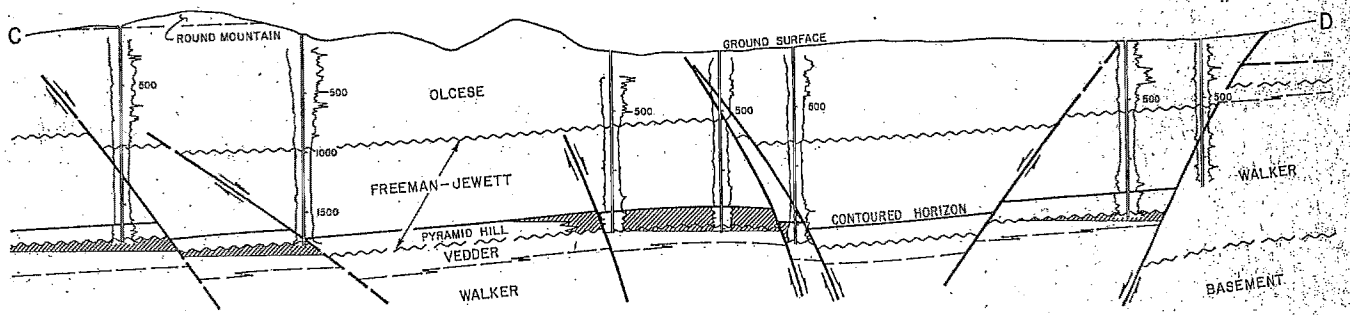
ROUND MOUNTAIN OIL FIELD

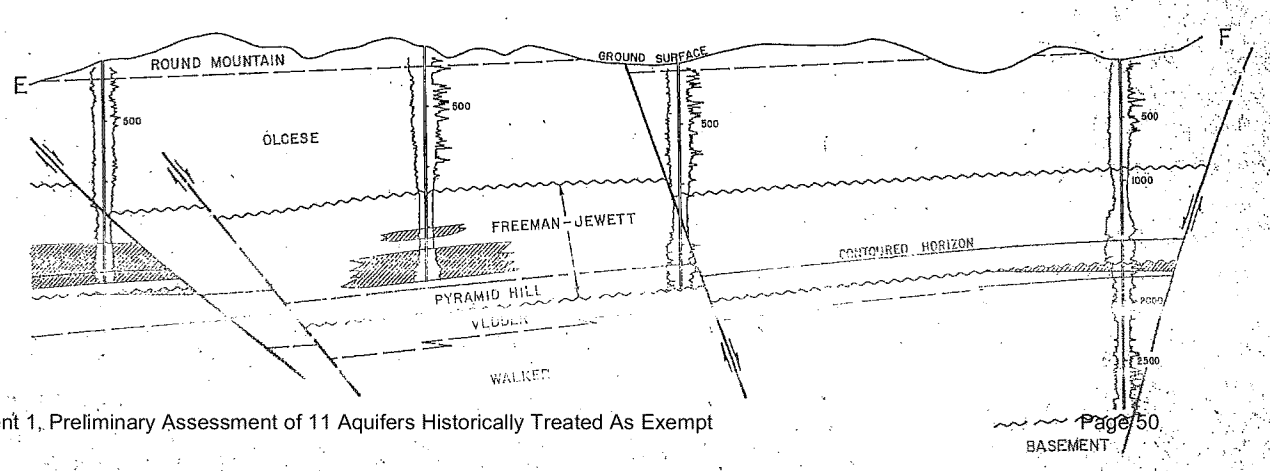




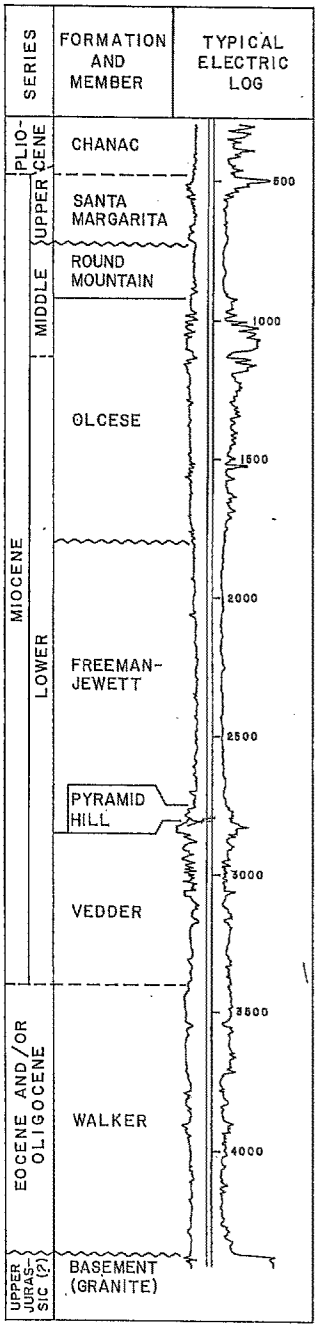
ROUND MOUNTAIN OIL FIELD

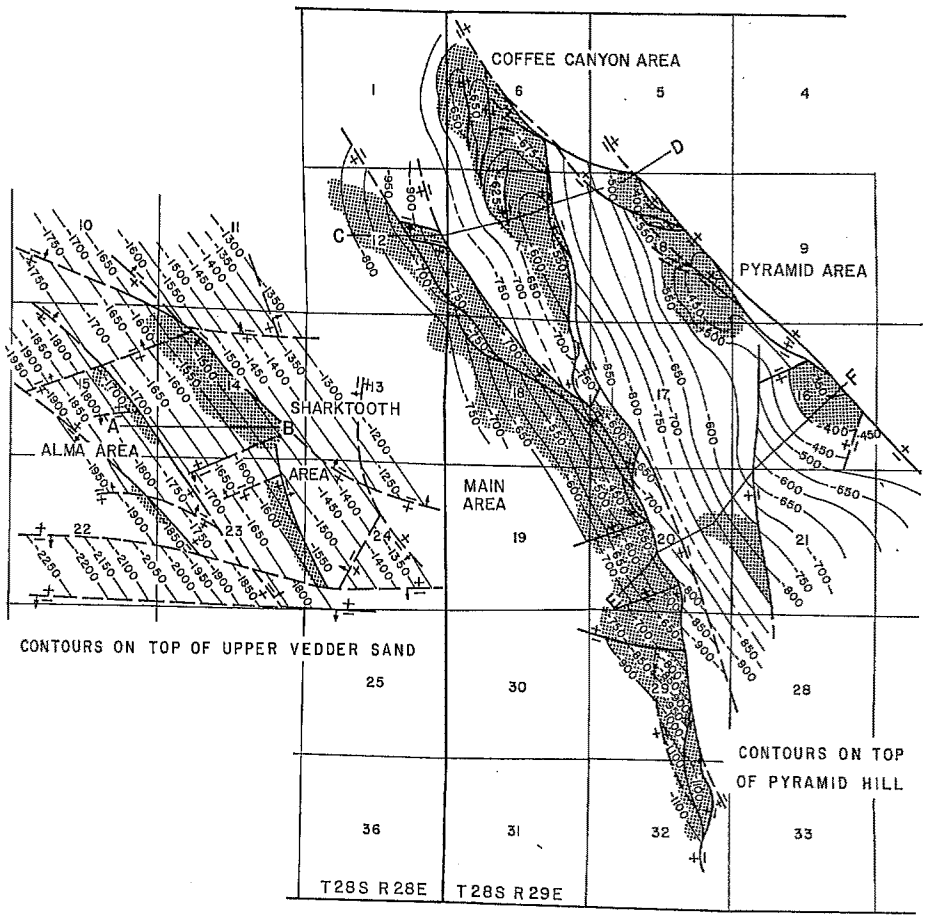






ROUND MOUNTAIN OIL FIELD





LOCATION: 14 miles northeast of Bakersfield

TYPE OF TRAP: See areas

ELEVATION: 600 - 1,500

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Jewett	Getty Oil Co. No. 2	Elbe Oil Land Dev. Co. No. 2	20 28S 29E	MD	*204	N.A.	May 1927
Pyramid Hill	Same as above	Same as above	20 28S 29E	MD	N.A.	N.A.	May 1927
Vedder	Same as above	Same as above	20 28S 29E	MD	N.A.	N.A.	May 1927

Remarks: * Production listed for Jewett is the combined production rate from the Jewett, Pyramid Hill, and Vedder zones.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
C.C. Killingsworth "Alma" 6	Barnsdall Oil Co. "Alma" 6	Mar 1948	15 28S 28E	MD	4,418	Basement (Granite)	Late Jur (?)

PRODUCING ZONES (See areas)

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
711,406	46,635	48,630,496	2,435	292	89,199,121	1,424,213	5,453,194	1938	665	468	2,590

STIMULATION DATA (Jan. 1, 1973) (See areas)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection

SPACING ACT: See areas.

BASE OF FRESH WATER: See areas.

CURRENT CASING PROGRAM: See areas.

METHOD OF WASTE DISPOSAL: See areas.

REMARKS:

REFERENCES: See areas.

CALIFORNIA DIVISION OF OIL AND GAS

ALMA AREA

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 700 - 1,270

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Vedder	Harold C. Morton & H.S. Kohlbush "Alma" 1	Same as present	15 28S 28E	MD	152	N.A.	Feb 1947

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
C.C. Killingsworth "Alma" 6	Barnsdall Oil Co. "Alma" 6	Mar 1948	15 28S 28E	MD	4,418	Basement (Granite)	Late Jur.

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Vedder	2,600	15	early Miocene	Vedder	13	N.A.	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
6,240	0	107,447	50	3	598,904	0	113,392	1948	47	21	80

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: None

CURRENT CASING PROGRAM: 8 5/8" cem. above zone; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps on outcrops of the Round Mountain Silt.

REMARKS:

REFERENCES: Albright, M.B. Jr., Sharktooth and Alma Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 42, No. 1 (1956).

CALIFORNIA DIVISION OF OIL AND GAS

ROUND MOUNTAIN OIL FIELD

Kern County

COFFEE CANYON AREA

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 690 - 1,300

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production		Date of completion
					Oil (bbl)	Gas (Mcf)	
Pyramid Hill	Acacia Oil Co. "Coffee" 1	Reynolds Oil and Gas Co. No. 1	6 28S 29E	MD	*600	N.A.	Sep 1928
Vedder	Acacia Oil Co. "Lindsay" 1	Lindsay Oil Co. No. 1	6 28S 29E	MD	800	N.A.	Aug 1928

Remarks: * Production is commingled from Pyramid Hill and Vedder.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth	
						Strata	Age
Richard S. Rheem, Opr. "Smoot-Vedder" 2	Same	May 1957	1 28S 28E	MD	2,313	Vedder	early Mio

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic		Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
			Age	Formation			
Pyramid Hill	1,500	150	early Miocene	Jewett	18	50	None
Vedder	1,650	30	early Miocene	Vedder	16	75	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production			1972 Proved acreage	1972 Average number producing wells	Cumulative production		Peak oil production		Total number of wells		Maximum proved acreage
Oil (bbl)	Net gas (Mcf)	Water (bbl)			Oil (bbl)	Gas (Mcf)	Barrels	Year	Drilled	Completed	
103,176	0	7,292,707	435	50	18,507,039	67,567	1,857,108	1937	133	104	475

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
Water flood	1960	3,815,746	1

SPACING ACT: Does not apply

BASE OF FRESH WATER: 0 - 200

CURRENT CASING PROGRAM: 7" cem. above zone; 5 1/2" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps on outcrops of the Round Mountain Silt.

REMARKS: A cyclic-steam injection project in the Pyramid Hill and Vedder zones was started in 1965 and terminated in 1968. Cumulative injection totals 12,200 bbls. The Pyramid Hill zone was originally known as the Elbe zone.

REFERENCES: Park, W.H., J.R. Weddle, J.A. Barnes, Main, Coffee Canyon, and Pyramid Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 49, No. 2 (1963).

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 600 - 1,500

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Jewett	Getty Oil Co. No. 2	Elbe Oil Land Dev. Co. No. 2	20 28S 29E	MD	*204	N.A.	May 1927
Pyramid Hill	Same as above	Same as above	20 28S 29E	MD	N.A.	N.A.	May 1927
Vedder	Same as above	Same as above	20 28S 29E	MD	N.A.	N.A.	May 1927

Remarks: * Production listed for Jewett is the combined production rate from the Jewett, Pyramid Hill, and Vedder zones.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Shell Oil Co. "Jewett" 3	Same	Jun 1928	29 28S 29E	MD	2,678	Walker	Eo &/or Olig.

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Jewett	1,600	130	early Miocene	Freeman-Jewett	22	N.A.	None
Pyramid Hill	1,900	150	early Miocene	Jewett	18	N.A.	None
Vedder	2,000	80	early Miocene	Vedder	16	95	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
510,916	46,561	35,953,284	1,415	171	59,572,216	1,293,959	3,794,620	1938	302	225	17465

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Does not apply

BASE OF FRESH WATER: None

CURRENT CASING PROGRAM: 7" cem. above zone; 5 1/2" liner landed through zone.

METHOD OF WASTE DISPOSAL: 4,845,286 bbl. of waste water was injected during 1972 into two disposal wells; percolation and evaporation sumps on outcrops of the Round Mountain Silt.

REMARKS: A water flood project in the Vedder zone was started in 1961 and terminated in 1963. Cumulative injection totals 872,587 bbls.

REFERENCES: Park, W.H., J.R. Neddle, J.A. Barnes, Main, Coffee Canyon, and Pyramid Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 49, No. 2 (1963).

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 730 - 1,470

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Pyramid Hill	Thomas Oil Co. "Olcese" 2	Harp & Brown "Olcese" 2	17 28S 29E	MD	5	0	May 1944
Vedder	Crestmont Oil Co. "Olcese" 1	Eastmont Oil Co. "Olcese" 1	16 28S 29E	MD	250	N.A.	May 1937
Walker	Crestmont Oil Co. "Staley" 11	Same as present	8 28S 29E	MD	40	N.A.	Jul 1943

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Piute Holding Co. "Smith" 1	Same	Oct 1929	17 28S 29E	MD	3,110	Walker	Eo &/or Olig

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Pyramid Hill	1,250	130	early Miocene	Jewett	18	50	None
Vedder	1,390	40	early Miocene	Vedder	16	80 - 110	None
Walker	1,535	50	Eo &/or Olig	Walker	20	N.A.	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
55,714	74	1,527,767	290	37	5,692,349	6,876	378,882	1946	98	60	300

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: None

CURRENT CASING PROGRAM: 8 5/8" or 7" cem. above zone; 6 5/8" or 5" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps on outcrops of the Round Mountain Silt.

REMARKS:

REFERENCES: Park, W.H., J.R. Weddle, J.A. Barnes, Main, Coffee Canyon, and Pyramid Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 49, No. 2 (1963).

LOCATION: See map sheet of Round Mountain Oil Field

TYPE OF TRAP: Faulted homocline

ELEVATION: 700 - 1,300

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial daily production: Oil (bbl)	Initial daily production: Gas (Mcf)	Date of completion
Vedder	G M V Oil Co. "Signal-Mills" 1	Bandini Petroleum Co. "Signal Mills" 1	24 28S 28E	MD	214	N.A.	Sep 1943

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Mobil Oil Corp. "Bradford" 1	General Petroleum Corp. "Bradford" 1	Jun 1943	15 28S 28E	MD	2,995	Vedder	early Mio

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Oil gravity (°API) or Gas (btu)	Salinity of zone water gr/gal	Class BOPE required
Vedder	2,400	25	early Miocene	Vedder	13	N.A.	None

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Oil (bbl)	1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Average number producing wells	Cumulative production: Oil (bbl)	Cumulative production: Gas (Mcf)	Peak oil production: Barrels	Peak oil production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
35,360	0	3,749,291	245	31	4,828,613	55,811	503,449	1947	85	58	270

STIMULATION DATA (Jan. 1, 1973)

Type of project	Date started	Cumulative injection - Water, bbl; Gas, Mcf; Steam, bbl (water equivalent)	Maximum number of wells used for injection
--			

SPACING ACT: Applies

BASE OF FRESH WATER: None

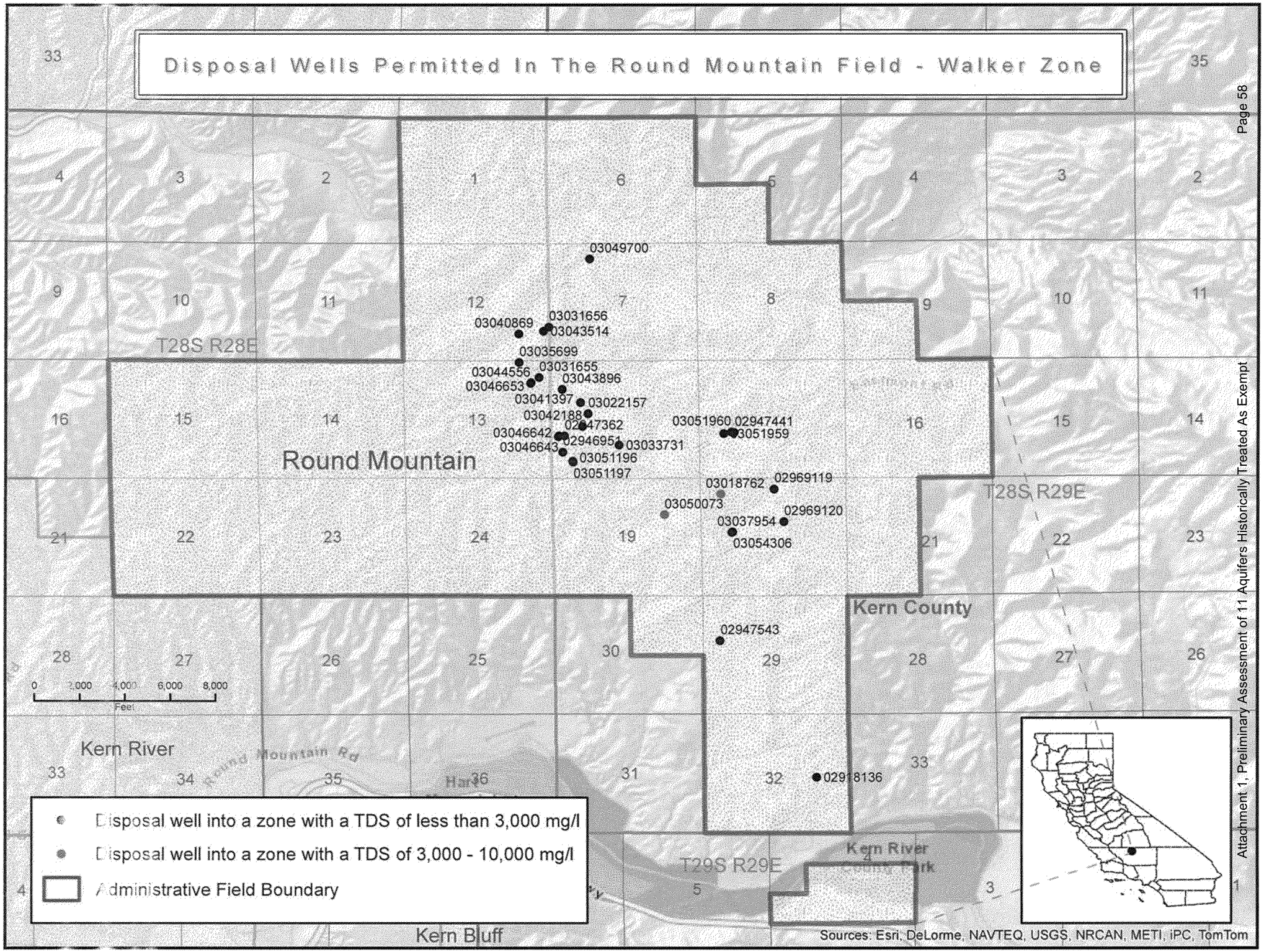
CURRENT CASING PROGRAM: 8 5/8" cem. above zone; 6 5/8" liner landed through zone.

METHOD OF WASTE DISPOSAL: Evaporation and percolation sumps on outcrops of the Round Mountain Silt.

REMARKS:

REFERENCES: Albright, M.B. Jr., Sharktooth and Alma Areas of Round Mountain Oil Field: Calif. Div. of Oil and Gas. Summary of Operations--Calif. Oil Fields, Vol. 42, No. 1 (1956).

Disposal Wells Permitted In The Round Mountain Field - Walker Zone



Bunker Gas Field, Undiff. (Post Eocene) Zone, Sacramento District Office

1) Number of disposal wells permitted in the zone:
   0

2) Number of active producers :
   0

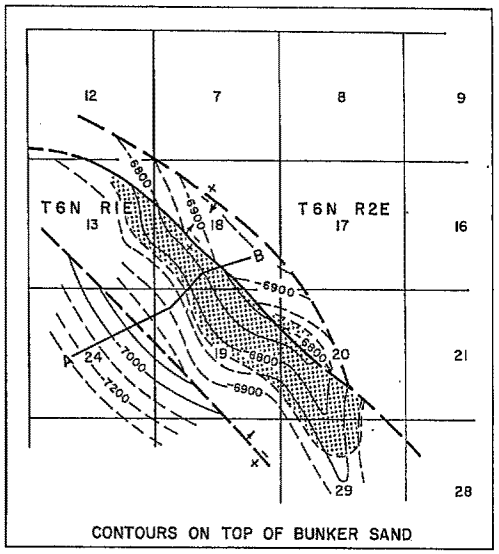
3) Depth of the zone across the field:
   3,000' below surface

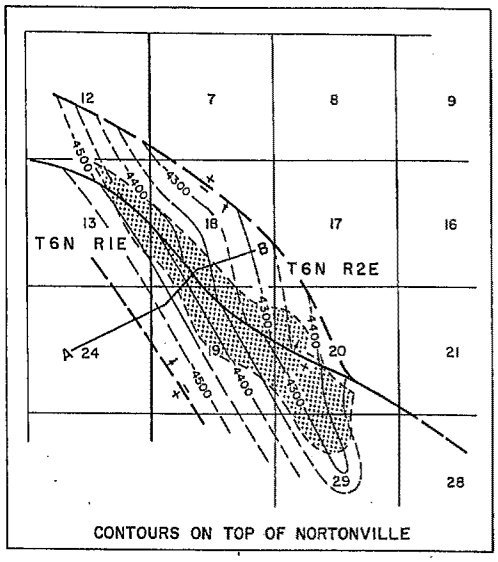
4) Volumes injected historically since 1983:
   51,454 Bbls, last injected on 11/1/1985. WD well API #095-00016 was P&A on 12/9/1986.

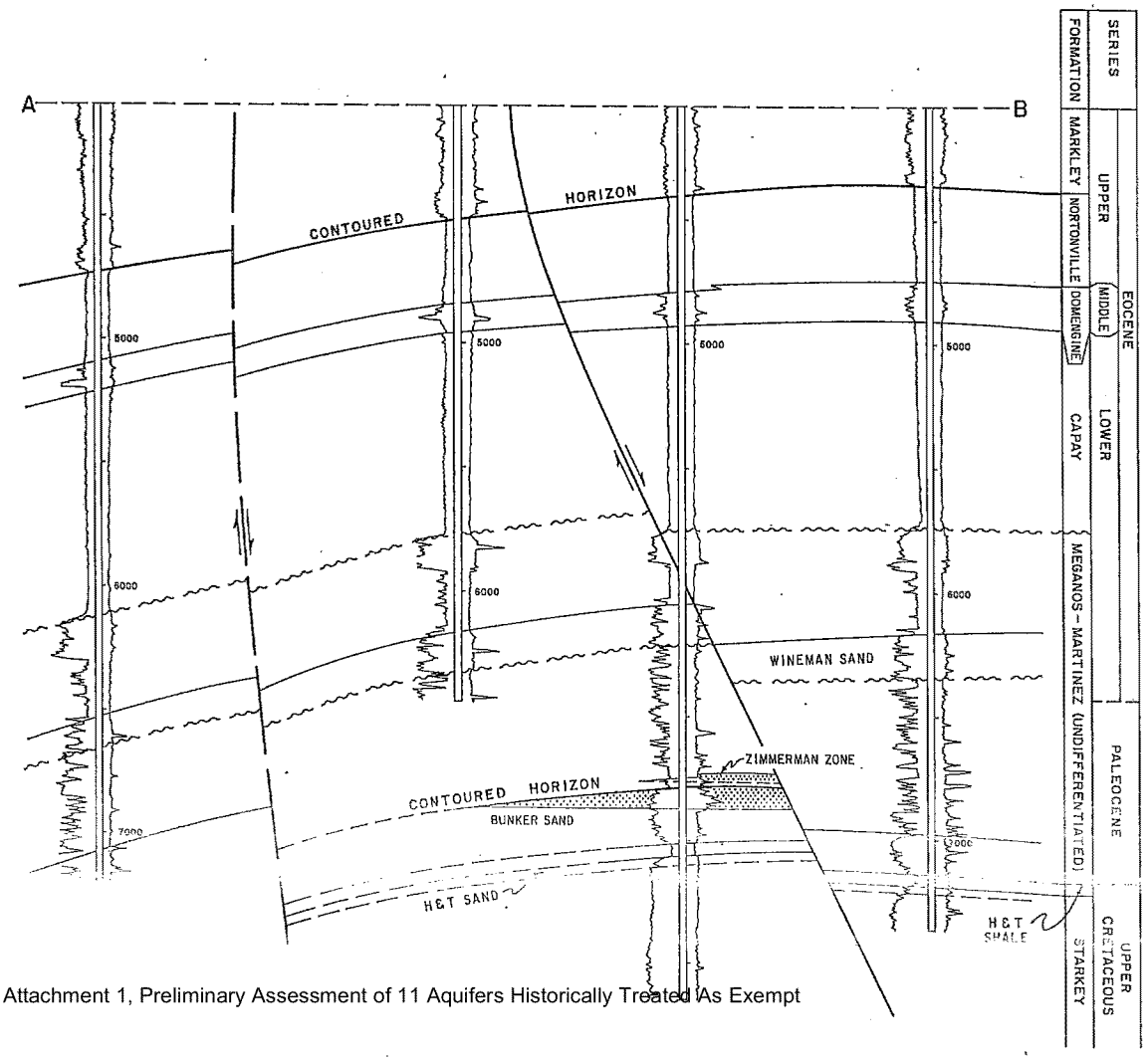
5) TDS of zone:
   1,215 mg/l TDS
   Sample collected from "BGZU" 601 well on January 16, 1974.

6) TDS of injection water:
   10,675 – 11,025 ppm Chloride
   Sample collected from "Bunker B-2 Zone" on April 26, 1973.

BUNKER GAS FIELD







LOCATION: 22 miles southwest of Sacramento

TYPE OF TRAP: Faulted anticline

ELEVATION: 25

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial production: Daily (Mcf)	Initial production: Flow pressure (psi)	Initial production: Bean size (in.)	Date of completion
Zimmerman	Amerada Hess Corp., Unit Oper. "BGZU" 901	Amerada Petroleum Corp., Oper. "Zimmerman" 1	29 6N 2E	MD	3,890	2,250	9/32	Aug. 1961
Bunker	Amerada Hess Corp., Unit Oper. "BGZU" 701	G.E. Kadane & Sons "Main Prairie Gas Unit A" 1	20 6N 2E	MD	3,425	2,250	1/4	Jun 1960

Remarks:

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Amerada Hess Corp., Unit Oper. "BGZU" 702	G.E. Kadane & Sons "Maine Prairie Gas Unit A" 2	Jan 1962	19 6N 2E	MD	10,098	Winters	Lt Cret

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Gas (btu)	Salinity of zone water gr/gal	Original zone pressure (psi)	Class BOPE required
Zimmerman	6,780	15	Paleocene	Martinez	1,075	4	2,930	IV
Bunker	6,845	25	Paleocene	Martinez	1,075	2	2,975	IV

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Maximum number producing wells	Cumulative gas production (Mcf)	Peak gas production: (Mcf)	Peak gas production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
3,073,729	6,704	810	8	53,141,694	10,457,830	1963	22	10	850

SPACING ACT: Applies

BASE OF FRESH WATER: 2,500 - 3,100

CURRENT CASING PROGRAM: 9 5/8" or 7" cem. 600; 4 1/2" cem. through zones and across base of fresh-water sands.

METHOD OF WASTE DISPOSAL:Disposal into sumps at well sites.

REMARKS: Commercial gas deliveries began in October 1961. 1972 condensate production 11,256 bbl.; cumulative condensate production 233,716 bbl.

REFERENCES: Hunter, W.J., Bunker Gas Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 47, No. 1 (1961).

Wild Goose Field, Undiff. Zone, Sacramento District Office

1) Number of disposal wells permitted in the zone:
   0 (only contains gas storage wells in this zone)

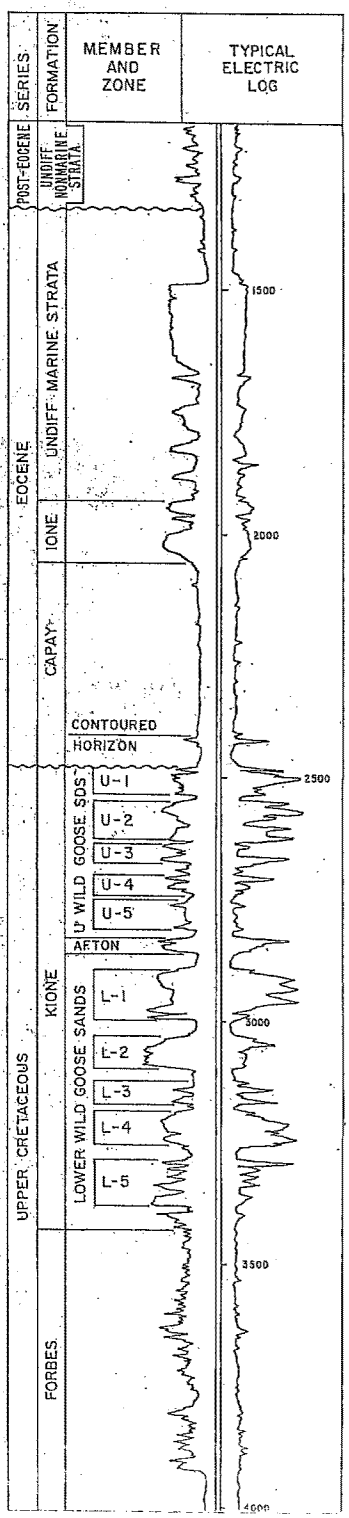
2) Number of active producers:
   0

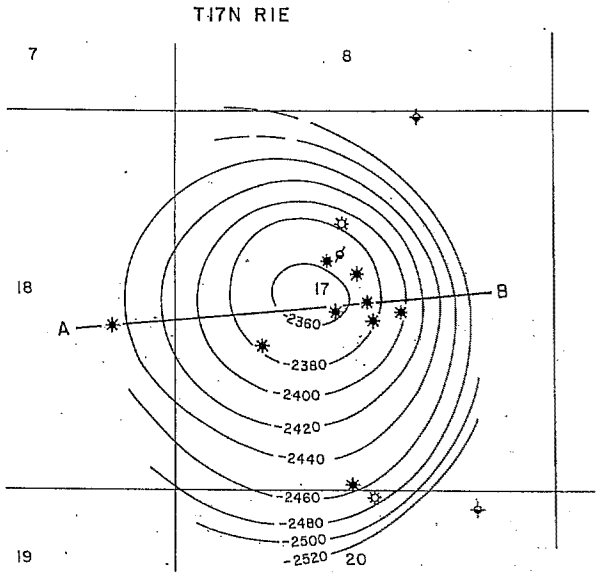
3) Depth of the zone across the field:
   2,700' – 3,400' below surface.

4) Volumes injected historically since 1983:
   None, only contains gas storage wells

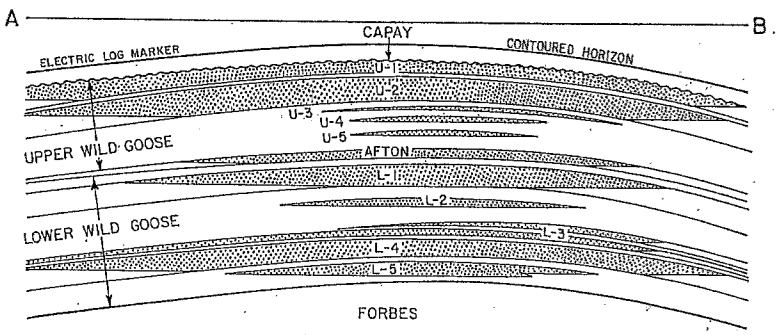
5) TDS of zone:
   24,349 mg/l TDS
   Geochemical Analysis of Kione L4 sample provided in UIC Project File.

6) TDS of injection water:
   24,349 mg/l TDS
   Geochemical Analysis of Kione L4 sample provided in UIC Project File.





CONTOURS ON ELECTRIC LOG MARKER IN CAPAY



LOCATION: 10 miles northwest of Colusa

TYPE OF TRAP: Dome

ELEVATION: 65

DISCOVERY DATA

Zone	Present operator and well name	Original operator and well name	Sec. T. & R.	B & M	Initial production: Daily (Mcf)	Initial production: Flow pressure (psi)	Initial production: Bean size (in.)	Date of completion
Hangtown (Sub Capay)	Exxon Corp. "Wild Goose Gas Unit 1" 6	Humble Oil & Rfg. Co. "Wild Goose" 6	17 17N 1E	MD	4,000	940	24/64	Sep 1963
Upper Wild Goose	Exxon Corp. "Wild Goose Gas Unit 1" 4	Honolulu Oil Corp. "Honolulu-Humble Wild Goose" 4	17 17N 1E	MD	7,340	880	36/64	Jul 1953
Afton	Exxon Corp. "Wild Goose Gas Unit 1" 6	Humble Oil & Rfg. Co. "Wild Goose" 6	17 17N 1E	MD	*4,840	1,040	24/64	Sep 1963
Lower Wild Goose	Exxon Corp. "Wild Goose Gas Unit 1" 1	Honolulu Oil Corp. "Honolulu-Humble Wild Goose" 1	17 17N 1E	MD	4,020	1,370	24/64	Aug 1951

Remarks: * Commingled production from Afton and Upper Wild Goose. Honolulu Oil Corp. tested this zone in open hole at a maximum rate of 2,980 Mcf per day in "Honolulu-Humble Tule Goose" 1 (now Exxon Corp. "Wild Goose Gas Unit 1" 7) during July 1952.

DEEPEST WELL DATA

Present operator and well name	Original operator and well name	Date started	Sec. T. & R.	B & M	Depth (feet)	At total depth: Strata	At total depth: Age
Exxon Corp. "Wild Goose Gas Unit 1" 11	Humble Oil & Rfg. Co. "Wild Goose Country Club" 7	Aug 1967	18 17N 1E	MD	7,004	Dobbins	Late Cret

PRODUCING ZONES

Zone	Average depth (feet)	Average net thickness (feet)	Geologic: Age	Geologic: Formation	Gas (btu)	Salinity of zone water gr/gal	Original zone pressure (psi)	Class BOPE required
Hangtown (Sub Capay)	2,400	10	Lt Cretaceous	Kione	N.A.	N.A.	1,105	IV
Upper Wild Goose	2,500	200	Lt Cretaceous	Kione	800	1,780 - 3,250	1,200 - 1,310	IV
Afton	2,850	30	Lt Cretaceous	Kione	N.A.	N.A.	1,335	IV
Lower Wild Goose	2,900	250	Lt Cretaceous	Kione	805	1,800 - 2,650	1,345 - 1,500	IV

PRODUCTION DATA (Jan. 1, 1973)

1972 Production: Net gas (Mcf)	1972 Production: Water (bbl)	1972 Proved acreage	1972 Maximum number producing wells	Cumulative gas production (Mcf)	Peak gas production: (Mcf)	Peak gas production: Year	Total number of wells: Drilled	Total number of wells: Completed	Maximum proved acreage
1,382,761	0	340	9	99,229,200	8,248,811	1961	16	11	360

SPACING ACT: Applies

BASE OF FRESH WATER: 1,050

CURRENT CASING PROGRAM: 9 5/8" cem. 500; 5 1/2" cem. through zones and across base of fresh-water sands.

METHOD OF WASTE DISPOSAL: Water is injected into Exxon Corp. disposal well.

REMARKS: Commercial gas deliveries began in November 1951.

REFERENCES: Hunter, G.W., Wild Goose Gas Field: Calif. Div. of Oil and Gas, Summary of Operations--Calif. Oil Fields, Vol. 41, No. 1 (1955).